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LIMITS OF LAND SETTLEMENT

A Report on Present-day Possibilities

Prepared under the direction of

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PREFACE

TEN specialists have joined in presenting this account of settlement possibilities and population capacity in the principal underdeveloped or frontier areas of the world. It was prepared for the Tenth International Studies Conference under the financial sponsorship of the American Coördinating Committee for International Studies.

Each author has prepared his account largely in his own way, with a minimum of systematizing suggestions. In this way we have sought to preserve the individualities of the several regions and the points of view of the authors.

The several chapters were prepared on very short notice, and in the face of other urgent demands upon their author's time. To all of my associates I wish to express my warm personal thanks for cordial responses to my request for collaboration in a public duty.

Dr. Karl J. Pelzer and Miss M. H. Ward supervised the preparation of maps drawn especially for this study, and saw the volume through the press. My thanks are due them and the draftsmen, Messrs. Forsythe, Smith, Schweitzer, and Philip, of the American Geographical Society of New York for the swift and competent execution of their tasks in time to permit the distribution of the volume to the members of the International Studies Conference at Paris in June. Thanks are due the American Geographical Society also for the use of map illustrations from two volumes "Pioneer Settlement" by twenty-six authors and "The Pioneer Fringe" by the undersigned, published by the Society in 1932 and 1931, respectively.

ISAIAH BOWMAN

The Johns Hopkins University,
Baltimore, Maryland,
May 1, 1937.

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INTRODUCTION

By Isaiah Bowman

The Johns Hopkins University

RELIEVING the population pressure in overcrowded lands is now a broad social, economic, and political question with unique twentieth century aspects that require fresh study and appraisal.

One conclusion stands out above the rest in a review of the following chapters: new land will accommodate too slow and small a stream of population to be of real social importance to the countries of origin. In our present nationalized world, in which the best lands have been occupied, and restrictive measures are in force, migration is no answer to economic and social strain induced by so-called overpopulation. Nor is military conquest either a practical or a rational answer. The struggle for additional territory as a step in empire building can be understood; the hope that it will furnish an offset to a high birth rate is based upon an illusion. No discernible or predictable stream of migration can keep pace with the birth rates of conspicuously overcrowded countries.

If a migrant starts out today to seek a new home in another land, where may he go and what are the conditions and effects of his going? Where do settlement possibilities suggest relief from population pressure elsewhere? The answers are difficult, for they must be made in terms that reflect almost all varieties of geographical habitat in the world, and take account of complex modern tools and methods, the varied relations of new lands to markets and transport facilities, the economic and social adaptability of migrants and their willingness to accept, for a time, standards of living below those of the home country. Pioneering is hard work, and it involves present sacrifice for future benefit. Faith in his own strength and in ultimate success must be an ingredient

of the permanent settler. "Government" is now expected to aid and make easy the way of the pioneer and to guarantee success. The migrant of 1937 wants civilization to follow him because the homeland is comparatively rich and safe in contrast to the meagreness and limited security of life on the frontier. In earlier classic eras of migration, medical aid was not available by telephone even in the homeland. The greatest losses of the pioneer of those days were friends and familiar scenes.

When all the world was primarily agricultural, a destination for the settler was relatively easy to choose. He could go where there was ready access to land in a climate not too much unlike that of his homeland, a place where manufactured things—chiefly implements and cloth—could follow him, and from which preferably rare and valuable products could be returned in exchange. If the land yielded mineral wealth or the adjacent sea was well-stocked, so much the better. Virginia tobacco, Newfoundland fish, Mexican silver, Peruvian gold, were among the inciting causes of migration in earlier eras. However, the prime cause of mass migration was the desire for a better living, and new land provided the readiest opportunity for a man with little or no capital. The rise of modern industry provided an additional incentive when western Europe found it profitable to draw heavily upon the outer world for supplementary supplies of basic food staples at the same time that western lands were demanding European capital in the form of credits for manufactures of wide variety and for industrial equipment. With industry established in the United States a later highly intensified movement to that country (in the period 1903-1913 it reached a million annually) had one of its springs in a growing demand for unskilled or semi-skilled labor to man the mills and factories in the "manufacturing belt" that grew up in the northeastern section extending from Chicago-St. Louis to Boston-Philadelphia.

Today the *limitations* of a new environment interest both the settler and the country to which he comes. Most of the pioneer lands that remain are "marginal" in climate, fertility, and transport. What are the subsistence crops required by

the settler, and also the cash crops that provide for commercial exchange and a return on the capital invested in settlement by government or private enterprise? All settlers are interested in political restrictions. Are the policies of the government liberal with respect to technical advice, transport to the field of settlement, schooling, foreign language privileges in the schools and courts? To determine the possibilities of settlement in any region account must also be taken of the people who are expected to settle in the region. From what lands and climates do they come? Does the stock still display pioneering aptitudes? Do the dietary habits of the settlers play a restrictive role? The native attitude toward immigrants is a social phase of the settlement problem, while accessibility, export and import trade, and production possibilities in relation to the cultural systems of the immigrants are among the economic phases.

These questions combine in unique form in each country in which land is open to settlement. No ready-made scheme of settlement can be set up that nicely balances the factors of race, region, climate, diet, and trade. Only the elements are available. No migratory groups are going to Russia today. Political and social conditions do not attract them, and Russia still struggles with the internal problem of finding land for her own people. Brazil has enormous possibilities of expansion of cultivable land, but its low technological level and its loose political organization preclude firm central guidance of the agencies that might provide rational settlement schemes in the broad and diversified territories where settlers have gone in recent years.

In most of the pioneer fringes of the world, experts are now required to plan out measures in advance if colonization is to be rational. An appraisal or inventory of the resources must be made. Population capacity and the well-being of settlers cannot be guessed at or left to an office of propaganda. It may be determined in part by the degree of applicability of new technical accomplishments in chemistry, agricultural machinery, seed improvement, and special techniques of cultivation. These, as well as the land itself, give the farmer new opportunities and an altered prospect for his family. Changes

in transport facilities also play their revolutionary part, political and economic aims often coinciding in this field. A recent news item describes the Soviet effort to develop and populate Siberian territory bordering on the Arctic—for the double purpose of extending land occupation and of increasing the strategic value of the Northeast Passage in the event of war between Russia and Japan.¹

We are already acquainted with the effect upon land occupation in the Canadian Prairie Provinces of a shortened period of growth and maturity for wheat. This has been one of the main factors in the wide deployment of farms to amazingly high latitudes in Saskatchewan, Alberta, and British Columbia. In 1935 it was reported that Professor Vavilov had found that by artificially beginning germination of wheat and other plants, and then keeping them for a time in cold storage, more than a month can be gained in their ripening. This will enable them to be grown in the short Arctic summer much farther north than has hitherto been possible. Much of the untilled land of northwestern China could be cultivated by extensive farming methods, if capital and the machinery for its administration were available.

We know too little of the effect upon white men of continuous residence in the tropics. In Queensland a healthy white population, in latitude 15°, appears to be living a normal life and doing all the hard manual work without, as yet, definite evidence of deterioration. That evidence may come later. It is too early to make a final appraisal. It is amazing to what an extent white population has gone into the climatic fringes—tropical Queensland, Australia, in contrast to northern Siberia. The course of empire now follows all compass directions. The earth's tolerance has been vastly widened by modern science.

What these experiments and experiences forecast is that the population capacity of the land depends not on its degree of vacancy, but on the total available resources that land, people, science, technology, and market demand, plus transport facilities, make possible in combinations that are largely

¹ To cope with the problem, a special people's commissariat has been established called the Superior Bureau of the Northern Maritime Route. *New York Times*, March 14, 1937.

unique from region to region and from country to country. Basic material can be provided, including maps and map notations, for the study of the general problem as well as the details of the several regions; but it is not out of such material that policies are made. These grow chiefly out of political, social, and economic conditions and situations. Once a policy has been determined upon, however, its form will be guided largely by the data presented in studies of this type.

THE PROSPECT FOR REDISTRIBUTION OF POPULATION

By Carl O. Sauer

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Population Change Must Be Considered Historically

THE population problems of the world can be defined only in so far as we have knowledge of growth or decline of human densities as distributed about the world in time. Population change has been very unevenly expressed spatially. There are areas that maintain, for a long time, a terrific rate of increase: there are others that, neglected for a time, have filled with a rush; there are still others that continue empty or nearly so to the present. In the first place, we need far more accurate descriptions of the distribution and "movement" of population over the world from period to period. Much more significant population maps could be made than any that we now have, and it is from them that the dynamics of population growth are to be read. The science of population, which has scarcely been begun, can answer questions regarding potential populations only by the most careful work in historical geography, in the phenomena of human distributions, and areal exploitations. As yet we lack mostly the evidence for projecting population trends areally. The following remarks, therefore, are inferences based on fragmentary knowledge and should be considered simply as a working thesis.

Political concern about population outlets appears from time to time, but perhaps has never been so urgent as at present. Whenever there is a population "problem" there is insufficient room for an expanding body, which seeks release in directions of low resistance and sufficient attraction. These areas of attraction then become the "frontiers" with reference to the expanding group. We who are of middle age remember

the covered wagons that trailed westward across the Mississippi Valley. As we watched them go by, there was only slight interest in their specific destination. Westward lay the frontier, and somewhere on that frontier they would find a place. The "movers" themselves often did not know where they would establish their homes. We were looking at a drift that had been going on for generations. There had been new lands for so long that people scarcely thought of a time when there would be no more such land. Yet in the present century the American frontier has about vanished. There was one last great burst into the Canadian Northwest and the Great Plains of the United States and, almost suddenly, the "mover" faded out of the picture. In our continent we have finally come to the end of the "new" land. If we have reached this condition elsewhere in the world, or are approaching it, we may very well have come to the end of what we have been pleased to call modern history, the expansion of western peoples and civilization over the thinly or weakly peopled spaces of the earth. For purposes of this discussion the thesis is set up that we have just ended one great period of history which may be dated as extending from 1492 to 1918, the latter date being used because of the war-time expansion of agricultural settlement into certain areas, such as our Great Plains. This period of four centuries saw the greatest migrations of man since Neolithic time and was marked by his most rapid increase. The expansion was due principally to the invasion of lands of lower and weakly resistant cultures by overflow from higher, aggressive cultures. The population growth in this time, however, depended also on migration of culture as well as on migration of people.

In order to regard the question of room for colonization, we may appropriately review the great population shifts of modern history.

Numerically we are most ill-informed until the nineteenth century. Since 1800 we estimate that the population of the world has more than doubled. We know that in the four centuries of modern history an enormously greater growth of population has taken place than in all the thousands of years of prior human existence. We know that approximately

half of the growth of the human race has occurred in about one century. The period immediately behind us is therefore a time that is unique in all history.

In terms of production, what has happened is that all of the major physical resources of the world have been brought into use, resource by resource and area by area, at first slowly, then with a rush, until only minor possibilities remain of the discovery of great additional centers or forms of raw materials. It may be shown similarly that, whereas in prior history cultures were in large measure self-contained, in modern history cultural resources have been diffused until it is difficult to find areas that have not received and tried the cultural goods of other parts of the world. In both respects, the blocking out of the world as to productive capacity, and hence as to population, has been realized as never before in history. To a degree previously unparalleled, population differences reflect the economic potentials of areas. Perhaps we can even say that, by and large, the people of the world today are where they belong under their present standards of living and cultural organizations. At any rate, a marked stabilization of the population of the world has come about, and marked shifts in relative density will become more exceptional and restricted as to areas involved. The physical world has been pretty well explored economically.

The Decline in Mineral Prospects

Modern history began with the great mining strikes of the New World. Perhaps this chapter of history terminates with the oil strikes of the early twentieth century. It is not at all likely that there will again be a discovery of minerals in any way comparable to that of the four centuries that lie between.

In little more than a century after their establishment on the mainland of America, the Spaniards had located and partially exploited every major district of precious metals in their territory that is known to us today, with the one exception of California. Latin America, as to gold, silver, lead, and copper mining, still depends mainly on districts found and opened up in colonial time. In particular, the silver production of the world comes principally from ore bodies discovered

by Spaniards during the first half century of exploration (except for silver as a by-product). For precious metals, both free-milling and the metallic sulphides with copper or lead in association, the major possibilities for discovery apparently are no longer in the young mountains of the Pacific but on the margins of the ancient shields in Arctic and sub-Arctic latitudes. We do not, however, expect the Canadian Northwest or the Lena Valley to bring about population movements comparable to those of the mines of Potosí, Zacatecas, or California.

Of the common metals there is no impending shortage, nor is there any great prospect of discovery of such ore bodies or processes as might revolutionize population distribution. Continued advance in the solution of metallurgic problems is not likely to cause any great relocation of industry or of population. In the case of iron ore, there are certain areas of large reserve that are now not producing, or are scarcely doing so. Their utilization in a world of reasonable freedom of commerce, however, will involve no important change in population. For iron and steel the tendency will continue to be to smelt the major part of the ore at or near the centers of power, though additional centers of hydro-electric power and "lower grade" fuels may emerge. The majority of the metallurgic areas of the world are very well established with regard to the most favorable combination of raw material assembly and distribution of products. It is likely that heavy industry will continue to be centered as at present, with probable additions in Brazil, China, and at ore bodies near the sea, with power reserves, such as the gulfs of St. Lawrence and Biscay.

The coal fields of the world are quite well reconnoitered, and the best ones are not only in use but are likely to be experiencing chronic population ills, as in the Appalachians. One may dream of coal-mining centers in Antarctica and of great chemical industries about the brown coal beds of Montana, but such visions are not likely to be realized for a long time to come. North China, now densely settled, holds the world's best prospects of increase in coal production.

Perhaps there still are deserts or tropical forests where

petroleum booms will establish clusters of towns. The life of oil wells, however, is hardly such that they offer population outlets. Moreover, a pessimistic tone dominates the explorations for petroleum. It would require an extraordinary optimist to predict that we shall find new oil fields for the present generation that will make good the exhaustion of the ones now in production. Search for new oil reserves has narrowed to more and more limited districts in increasingly remote and difficult locations. At best a small number of workers will be able to produce such oil for export to refineries.

Though great mineral discoveries began our age of history, we now rely increasingly on technology rather than on discovery to satisfy our changing mineral needs. Hence, the mining boom is pretty well eliminated from major significance in future population shift.

The Spread of Old World Garden Crops

From the Orient, orchard and garden crops, dominantly of hand tillage, early penetrated the Mediterranean and thence passed to the New World, there to give rise to a great development of plantations. Of these, sugar cane was earliest and chiefest. It principally was responsible for establishing an African population on the west side of the Atlantic. Sugar cane has continued to be one of the greatest agencies in distributing contract and peon labor through the margins of the tropics. A less equivocal gift from the Old World were the plantains, which have in modern time largely increased the food supply of tropical areas in the New World and in the islands of the Pacific. It is interesting that the banana, though it is not aggressive in reproducing itself, spread more rapidly than did the Europeans through the tropics of the New World and soon came to be considered a native plant.

Within the Orient a great trade has developed in the principal native starch, rice. The younger and less populous Indo-Chinese lands of monsoon rains and of ample flood plains of late years have poured a great stream of rice into the lands where population outstripped the local food supply. This inter-Oriental rice trade itself is the result in considerable measure of the large world demand developed for the more

intensive garden cultures of the Orient, principally tea and silk. The ancient spice lands of the East have continued to supply the rest of the world with greater and greater quantities of agricultural luxuries, depending on larger use of skillful labor on small areas. It is here the commodity and not the crop that enjoys an increasing spread. Increase in these goods rests on their steadily increased absorption by the western world, and this has made possible intensification and extension of settlement within the Orient.

A belated migrant from the subtropical Old World is coffee, which has found its home primarily in the New World, where a fortunate combination of climate, terrain, and freedom from disease made possible the large-scale appropriation of new lands at the time when the demand for coffee was increasing most sharply in our urbanized populations.

In general the migration of the crops from the monsoon lands of the Old World is about finished. They are known and grown almost everywhere where they will succeed. They are not thus grown on a large scale except in limited areas of superior advantage. There is available a great deal more subtropical land on which they might be largely produced; but they are garden crops of high yield from small areas, requiring mostly intensive application of skillful labor, and the demand for them is limited. Some of them, like coffee and sugar cane, are now available in surpluses sufficiently large to cause distress.

Additional ricelands, well situated for export, could be used at present by the terrifically growing population of the rice-eating Orient. It is difficult to find such lands, however. The nearer valleys, such as those of Indo-China, are pretty well engaged in such cultivation. Rice does best in flood plains of monsoon climate. Where might one find similar large fertile lowlands with plenty of moisture in early summer and a marked dry season following? A few thousand hectares here and there, especially with the aid of irrigation, can undoubtedly be developed, but the great good ricelands are occupied. The rainy tropics may perhaps be invaded by rice, but it is significant that they have thus far resisted such invasion on

any significant scale, though plantings have been made in them for many years.

The Diffusion of New World Crops

Another great phase of modern expansion of population is associated with the spread of New World crops.

The role of the potato in revolutionizing North European agriculture and making possible a large increase of population is too well known to need elaboration. In limited measure the potato may still pioneer expansion of settlement into the colder and less desirable fringes of far northern lands. Any such expansion, however, will be far more important for subsistence farming than for commercial agriculture. If, for instance, an economic basis for the development of Alaska can be worked out, the potato may make possible the feeding of such a population. It is not likely, however, to cause people to settle Alaska.

Manioc has made possible an important expansion of population in negro Africa. It seems to have revolutionized living in various savanna lands of that continent by introducing a high-yield crop into lands too dry to grow plantains. Farther east as well manioc has increased population densities in lands on the dry borders of the tropical rain forests. Maize has contributed similarly to population increase in lands of summer moisture in southern Europe and the Orient and now appears to be well established in agricultural economy all over the Old World to its climatic limits.

The most important extension of New World crops has been in the New World itself. Here the settlement of the United States well into the nineteenth century is primarily a story of forest clearing and "hill" planting of native American crops, carried on by whites. In each case the plant was well perfected aboriginally, but the white man added to the technique of production and developed a large commercial outlet. The white man took the ritually used tobacco of the Indian and made it one of the first great crops of oversea commerce. He has kept it in large production by the aid of the fertilizer chemist. He discovered that maize was a far better feed grain than he had possessed before, and he built

on it a world trade in lard and pork. He took the upland cotton of Mexican origin and by the invention of the gin gave the world its first cheap vegetable fiber. Each of these cultural adaptations resulted in a great forward surge of population. Together they account in the main for the expansion of American settlement to and beyond the western limit of the eastern woodlands of the United States. Because these processes of adaptation were developed in North America, they are still more significant in the distribution of population with us than in the Old World. An intensified livestock farming based on corn could undoubtedly be developed beyond present conditions in the Argentine, Uruguay, Paraguay, and parts of Brazil. Here lies one of the more hopeful outlooks for population growth, however, provided the world needs more pork products. Tobacco and cotton admittedly can be grown advantageously in many parts of the world in so far as physical conditions are concerned.

In the nature of their domestication the American crops demand a good deal of labor and give high per acre returns. They also lend themselves moderately well to mechanical cultivation. They are perhaps the most attractive group of crops as to expansive possibilities and are likely to be significant in any future expansion of the settled area of the world, as well as in the increase of population of already developed areas.

The Spread of Nontropical Old World Crops and Animals

Until the nineteenth century the transfer of European crops and animals to the New World meant little more than that the colonists maintained through them their material culture on a subsistence basis in their new homes. The expansion of population in the nineteenth century is principally a matter of the commercial occupation of the great grasslands of the world. These had lain largely neglected previously, except for a small trade in hides and tallow. The industrial revolution made their exploitation possible, and they in turn made possible the full realization of the industrial revolution. They gave us our famous frontier of cattle and sheep ranches, followed by the plow that broke the plains. Steamship, canal, and railroad are necessary to move the bulky products of the

grassland farms and to carry in machinery and structural materials. Capital, in large amount, was necessary to provide the means of improvement.

The great grasslands of the world from the beginning of time to the nineteenth century had been left pretty well to the nomads and had thus remained the great relatively empty spots of the world in mid-latitudes. It required modern transport, heavy horses, horse husbandry, and the modern plow which could turn the heavy sod effectively, before they were ready for settlement. The great migrations of the last century everywhere have been into the grasslands, first into the humid prairies and park lands, then into the subhumid lands. The story begins first in South Russia. It reaches its greatest sweep in the United States. It is continued in the Argentine, in western Canada, in Australia, and in South Africa. It ends, and ends for all time, in the Canadian Northwest and the plains of Manchuria and Mongolia.

The critical crops are the small grains. First come the ancient field grains of Europe. As the dry margins of the grasslands were penetrated, drought-resistant varieties of these grains were collected from the drier fringes of Old World agriculture and were further improved in the new lands. Finally, the very desert margins of the Old World were combed to yield the least exacting of all grains, the sorghums and their kin, for the last push of farming into the steppe. These plant resources have been well canvassed. We now know that, with all we have of dry country crops and all we know of dry farming, expansion of fields has been pushed into the steppes well beyond the limits of reasonable climatic risk. We now have an ebb of population to claim our attention in these dry margins.

Extension by Irrigation and Drainage Engineering

The last half of the past century saw important extensions of the habitable area by agricultural engineering. Irrigation and drainage projects have been carried out at a rapid rate in the technologically more advanced lands. The cycle of development, usually, has been brief. The cheaply reclaimable lands soon were thus appropriated. Where expensive works

are necessary, crops of high return must be produced. These are in general subtropical crops limited to warm lands of long growing season. It is not likely that additional development of such land is economically feasible on any large scale in a country such as the United States. There do remain, in rather low latitudes, various attractive possibilities of land reclamation in engineering. Perhaps the most notable such area in the world is Mesopotamia, but there are numerous lesser possibilities in Latin America.

Extension by Lumbering

Lumbering as a form of land utilization leading to large and permanent settlement is hardly in the same category with the forms of extension of population that have been mentioned. It has come very late in economic history and still has modest reserves of land available, mostly in tropical forests of high logging costs.

Shrinking Subsistence Bases

This sketch of the filling in of the world with new people who bring new activities must at once be revised and reduced. One of the striking features of this greatest population movement of all time is that it sadly overreached itself. In the first place, while men were prospecting land by trying what they could do with it, many of them settled on land that was unfit for the purposes of the settlement. A notorious illustration of this has been the invasion of the semiarid Great Plains of the United States by grain farmers during recent periods of high grain prices.

Again, the rush of people into new lands for their commercial exploitation has brought about an extent and degree of destructive exploitation of the land which we are just beginning to realize and which is extremely difficult to arrest. A considerable part of the growth of the nineteenth century and of our own time has been by a process of skimming the cream from the earth. As yet uncalculated areas of land that have been under use at most for a few generations have been gutted or damaged in such a fashion that they can no longer maintain their economy or take care of their pres-

ent population. And this is an outstanding feature of the new lands of the earth, not of the old inhabited ones. In this sense large parts of North America, Australia, South Africa, and southern South America have become problem areas as to the possibility of maintenance of their population.

Let us regard briefly the shrinking of the subsistence base in the United States, which has given rise to the so-called conservation movement. A serious population problem exists in our southeastern states, which are the area in which destructive exploitation first became apparent. This area is primarily one of the forested uplands in which tobacco and cotton culture developed. The economy resulted in the development of a relatively dense rural population, but also in the process of long continued clean cultivation there resulted a gradual destruction of the topsoil. In very large measure present agriculture is being maintained only by the feeding of the subsoil, which now is at the surface, with chemical fertilizer and by increasingly costly mechanical devices to retard the washing away of the surface. Both crops, and they are the fundamental crops of our southern economy, have shown themselves to be very hazardous in cultivation of slopes, even of slopes of low degree. Cotton, for instance, found two areas of superior attraction in very gently rolling prairie plains. The older of these was the so-called Black Belt, located largely in Alabama, a region of faint slopes and initially high fertility. Yet here, on slopes of as little as one degree, the fertile soil has been lost and almost the entire area has been forced out of cotton growing into a more extensive pasture and dairy economy. The great, black, waxy prairies of central Texas are now suffering rapid destruction under cotton growing. Prevalently the southern uplands, even the very smoothest, have been damaged, probably irreparably, by their agricultural economy, and the redevelopment of an adequate mode of living for the rural population of the South is one of the gravest problems confronting this country.

Even the Corn Belt, pride of American agriculture, has not remained unscathed. It first became widely apparent in northern Missouri that the prairies of Corn Belt farming were becoming frayed. We now have evidence that a fourth of the

land of Iowa has suffered serious soil erosion. The dust storms originating on the western High Plains are conditioned by the plowing up of those plains for small-grain farming. Still farther west, the range lands have not only lost a large part of their stock-carrying capacity, but permanent damage by washing, resulting from overgrazing, is again generally prevalent on slopes. The agricultural surpluses of the United States have been produced, it would seem, by dissipation of the land capital. Soil conservation, resettlement, and reorientation of rural economy are major current problems of the United States.

The debit column of our land exploitation could be continued indefinitely. The states on the Great Lakes realized years ago that in dissipating their timber resources they had reduced a large part of their land to permanent poverty. Farms cannot follow forests in much of the timber country, and the cutting of trees is not simply a matter of waiting for their regrowth. The history of our lumbering again has often involved permanent damage to the land or at least damage that cannot be made good except by an excessively long period of re-establishing forest growth. These illustrations may suffice to call attention to the really serious theme of destructive exploitation in lately settled lands in various parts of the world, which brings them very early to a condition of overpopulation.

*The Decimation of Native Populations as an Element in
Modern Settlement*

The whole oversea expansion of European population has been based on the feeble opposition presented by aboriginal population. This condition was true not only of the New World proper but of Australia and of Australasia. In highly polemic manner the fading of the native populations was first presented by Bartolomé de Las Casas in his diatribe on the Destruction of the Indies. Whereas the missionary bishop placed excessive emphasis on the cruelties of the Spaniards, the central fact that native populations melted away under the impact of Europeans is increasingly substantiated by our growing knowledge of the early records and the archeology.

At the end of the sixteenth century it was a commonplace with virtually all recorders to say that only a small fraction of the original population remained in Latin America.

The main point is this, apparently: The continental lands of the Old World had had contacts between their populations for so long that their contagious diseases were widely endemic through the Old World and that immunity, prophylaxis, or treatment, but especially the first, restricted the severity of the outbreaks. In America and the island masses of the Pacific Ocean, on the other hand, these contagious diseases were lacking. Perhaps we shall never have a good history of contagion; but this much is apparent, that the newly found lands were swept, with great mortality, by disease after disease brought from the Old World. Relatively benign Old World diseases became New World plagues. Death by plague out-traveled the white man and emptied the land for him so that he had an abundance of unoccupied land for all his wants. In good measure the occupation of the New World has been a matter of refilling it with population.

No such event is likely ever to happen again. Should the white man, for instance, undertake to settle in number in Africa, he will not find that disease will clear the way for him. Like other manifestations of culture, the diseases of man have attained the major limits of their possible distribution. On the other hand, the entry of a higher, let us say European civilization, now means a general improvement of sanitation and a lowering of mortality. The introduction of white settlement tends to be reflected in major benefits of sanitation applied to the native population. In so far as this population has higher reproductive rates than the white colonists, there is therefore a tendency for its growth to outstrip the growth of white population and to exert pressure against the European colonist increasingly as time goes on.

Remaining Empty Lands

Where then, may we ask, are the land areas that still are thinly peopled? The answer has become almost distressingly easy. With two principal exceptions, these are areas of unsolved climatic problems.

The first and perhaps most notable exception is to be found in South America. In South America, in the aggregate, large areas of land are still held out of full settlement by the existence of what are in effect latifundias. The other principal exception is in Inner Asia, where pastoral peoples that will not practise farming have held lands capable of agricultural settlement. This situation, however, is breaking down very rapidly, not only in Manchuria where it is well destroyed, but by a similar invasion of farmers under way from the Chinese side in Mongolia and from the Russian side in Turkestan and adjacent Siberia.

On a population map of the world the greatest empty spot is the Arctic fringe. Here everywhere the frontier of civilized settlement is advancing very slowly. Shortness of growing season, hazard of summer frost, limited utility of possible crops, the "raw humus" cover of the soil, and the extreme slowness and difficulty with which trees may be removed are the principal difficulties. Even in Sweden and Finland, where the population is immediately at hand to press against the northern forests, rate of advance has been exceedingly slow.

Less thinly peopled than the polar margins are the tropical forests. Those of the New World are far emptier than those of the Old. It may be noted in this connection that our American tropical forests seem to have far fewer people than they did at the first coming of the white man and perhaps that the present inhabitants live at a lower cultural level. This is as yet one of the unexplained problems of the New World, but the recurrence of the condition is so widespread that the generalization appears to be sound. The disparity between the population of the American and Old World forested tropics may well be due to the introduction of diseases from the Old World. At any rate, in some manner the establishment of contacts with the Old World destroyed the forest people of American tropical lowlands, and they have remained poorly occupied to the present. It would appear, therefore, that modern hygiene might have the opportunity of repeopling the New World tropical forests. Whether such lands come seriously into question for colonists from lands beyond the tropics is a fiercely debated question. There seems to be more sound

than knowledge in the literature on the subject, yet satisfactory physiologic inquiry should be quite feasible.

Perhaps equally serious is the cultural problem of these forests. Their tillage is prevalently by hoe culture, and both in their crops and physical conditions there are serious difficulties in the way of a shift to the tillage methods of European farmers. The fact that these lands have been so resistant to a reorganization of their economy, except in a few instances, indicates that they present unsolved problems—problems, however, which it must be admitted have not been sufficiently canvassed.

The thinly peopled dry lands are of speculative interest chiefly in so far as they have possibilities of irrigation. The expectations of dry farming as to conserving water by tillage have had only limited success, and the crops of minimum water requirement have been pretty well brought into use. The savanna lands of excessively brief but rather dependable rains may have possibilities if experiments to be mentioned below, in reducing the period necessary for germination, are successful.

Latent Technologic Possibilities

In terms of the present productive skill of man, the world is pretty well populated. Density of population tends more and more to approximate known productive capacity. For future relocations there is involved the solution of a series of technologic problems. A few of these are:

1) The finding of new crops offers minor opportunities. Civilized man has shown little success in the domestication of wild plants. Various reasons may be advanced, but the fact is admitted. We do not know whether he will find new plant resources that he can shape to his ends, in order to extend his range.

2) The world's resources in domesticated crops have certainly been canvassed pretty thoroughly. There is little likelihood that any valuable domesticated species remains to be disseminated. This is somewhat less true of varieties adapted to special and extreme conditions. Even here, however, the returns of agricultural plant exploration for drought, cold, or

alkali resistance are diminishing. The plant breeder is still extending somewhat the range of plant conquests in these directions, but the rate of progress is slow and "miracle" plants are likely to be of the order of frequency of miracles.

3) In agricultural practice there may be sensational possibilities in the seed treatment known as vernalization. It has been discovered that the growing period of many seeds can be shortened by a simple treatment prior to their planting. In simplest terms, these seeds fall into two groups, those that are cool-starting and those that are warm-starting. If it is possible to shorten the growing period of the cool-starting seeds by several weeks or a month, it may be possible largely, for example, to increase the poleward range of the small grains. This in itself, however, will not mean an easy conquest of an additional great belt of territory along the polar fringe of agriculture. There still remains the stubborn fact that removal of stumps and roots involves labor to such an extent as to maintain these lands economically submarginal. It is easier to dream of large change in connection with the warm-starting crops. If here again the growing season may be shortened markedly, a good deal of the drier savanna country can be occupied by farmers. In any case, the experiments with vernalization are among the most interesting things to watch in connection with possible population shifts.

4) Potentially a large role may be assigned to the extension of public hygiene. The problem of the tropics is largely a problem of health. If low latitudes can be made more habitable in terms of health, they can and will carry larger populations, but perhaps not people of mid-latitude origins.

It would appear, therefore, that our expectations of colonization must turn principally to low-latitude lands, and in far less degree to high-latitude and arid lands. Most expansion will depend on technologic advance, not on old-fashioned pioneering.

Technologic advance, however, may develop more benefits within the areas of advanced technology than in the outlying parts of the world. It is quite likely to do so, in so far as European migration is concerned. For instance, the problem of the tropics, if it is solved, will be solved step by step. In

that case, will not an increase in the native stocks or an influx from near-by areas continue to take up whatever slack there is in the population, in so far as most of the increased production of goods is concerned?

In conclusion, it appears to this commentator that the population of the world has become sedentary permanently, that most of its inhabitants are where they belong. Some possibilities of small-scale colonization have been indicated, though these for the most part involve in some manner questions of land reclamation or of hygiene. A migration by low-standard groups could press on a large scale into lands of higher standards, but the latter have become highly sensitive to such pressure and have raised elaborate barriers. In a world that is less given to dislike and distrust of the foreigner than our momentary world, there is of course still a great deal of room for the dispersal of trained men from the old countries into the younger ones. These professional men and artisans, however, will most naturally find their places as individuals in going communities. That the young European doctor or mechanic should again find place overseas is desirable, but he and his offspring will not be colonists. They will pass into the communities that receive them.

In a reasonable world in which goods may flow freely, there may be expected to continue strong contrasts in population density which reflect persistent contrasts in economic advantage. The less strangulation of trade there is by politics, the less likely are areas of dense population to be areas of overpopulation. At bottom, areas of great accumulation of population are areas of great and persistent economic advantage and cultural energy. In a reasonable world, is not the average European likely to benefit most by elaboration of his skill in his own land? The inhabitant of Europe has at his immediate disposal not only the apparatus and stimulation of an advanced civilization, but he enjoys a unique advantage over the rest of the world. It is that he lives at the center of the world; he has the shortest distance to the ends of the earth and their way stations. This advantage is as permanent as the design of the continents and oceans. If the European

can deal freely and amicably with the rest of the world, he is in the best position to do so in his own land. If he sees the advantages to himself of the greatest possible national relaxation of barriers, Europe is perhaps of all parts of the world the best suited to support a larger population.

THE FOOD SUPPLY IN THE MIGRATION PROCESS

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THE theme of this paper is the role the food supply may play in influencing or directing migration. This is here taken to mean the obstacles, if any, that arise when immigrants are forced to abandon the diet of their forefathers and live upon such foodstuffs as are obtainable in a new country. These difficulties are obviously of three sorts, psychological, physiological, and economic, and each of these categories needs to be examined in turn.

Psychological factors may slow up the rate of migration somewhat but there is no historical evidence that they have ever inhibited immigration, except in combination with economic factors. It is doubtful that any people have refrained from invading a thinly peopled region because the diet there was one to which they were unaccustomed. Englishmen were not deterred from settling New England because at first they were forced to subsist upon the natives' diet: maize, beans, pumpkins, squashes, and game. Portuguese were not kept out of the Amazon Basin because they had to depend so largely upon the Indians' food staple, cassava (also known as manioc, tapioca, or yuca). Indeed, the influence of diet upon immigration is given more weight by students of population than it merits—perhaps because Malthus attributed so large a role to undernourishment as one of the checks upon population increase; perhaps because this Malthusian idea is the basis of the so-called iron law of wages.

Psychological difficulties do arise, however, from the fact that in the last hundred years or so the level of living has risen in most parts of the world. It is as true as ever that

population tends to flow from a region of low to one of a higher level of living. The potential gradient, if a metaphor derived from hydraulics is permissible, is rather one of levels of living than of density of population. People may move from a region of slight density of population but low living standards to one of greater density of population but higher living standards (Mexico → U. S. A.). With general rise in the level of living, these potentials have tended to become less effective than they used to be. When the living level in the home country is high the prospective emigrant hesitates to move into a region where the living level is low, even if there is prospect that after years of struggle in the new environment he may in the end achieve possibly for himself, probably for his children, and certainly for his grandchildren, a much higher level of living. The modern man in most countries demands more than his father and his grandfather did. And this "more" is especially important in the matter of diet.

People resist a worsening of their diet perhaps more stubbornly than impairment of their shelter or their clothing. Where the level of living is rising the diet tends to consist of lesser quantities of carbohydrate foods (cereals, potatoes, etc.) and of increasing proportions of the more concentrated and luxurious foods (meat, dairy products, fats, fresh fruits, and vegetables). If immigration is accompanied by lowering of the level of living, the immigrant is under pressure to worsen his diet; and this he resists even when the cheaper diet is as wholesome, or more wholesome, than the more luxurious diet to which he had been accustomed at home. In that event his resistance has a purely psychological origin. In most new countries some of the more luxurious foods are high in price because they have to be imported. Their character is such that their production in the new country may not be undertaken for some time. Except for imported food, the foodstuffs available in a new country tend at first to be fewer than in old settled countries. The diet tends to be more monotonous and less varied, and this may be felt by immigrants as a serious lowering of their level of living.

Taste no doubt also plays a role. The white settlers in Queensland are reported as having created difficulties for

had been accustomed; but this has not prevented their final adaptation to a tropical environment or the settling of Queensland.¹ Taboos, religious and social, also have their effects. The Japanese dislike milk, prefer fish to meat, and rice to wheat; but that has not hindered their going to regions where the standard of living is higher than in Japan (e.g. United States or British Columbia). The Japanese preference for rice is not solely based on taste but also on social considerations. The diet of many poor Japanese peasants contains more barley and millet than rice, more beans than fish. The consumption of rice confers social status, much as eating white bread did in parts of western Europe during the eighteenth century. However, in a new country taboos and other social factors tend to become ineffective, and new ones take their place. Thus, in some sections of Latin America mutton is not highly regarded as a food—apparently because only the lowest classes concern themselves with sheep; only noble beasts like the horse or the steer are worthy of a gentleman's consideration. Somewhat akin to this taboo is the attitude of certain cattle-herding African tribes who regard agriculture as an occupation not fit for a man and a warrior but only for women, slaves, and conquered tribes. Such taboos may at times delay the introduction in a given area of the form of agriculture best adapted to it, but it is never for long likely to be a controlling factor with respect to immigration.

In the past, the empty spaces of the earth were peopled gradually over a long period of time. The immigrants were at first predominantly subsistence farmers. They expected to hew down forests, to ford streams, to live in hovels, to work from dawn to dark, to do without newspapers or books, without modern forms of amusement, to live in isolation at great distances from neighbors, to do with few educational opportunities for their children, to do without police protection or doctors—they were ready to live at so low a level of subsistence provided they could look forward to the ownership of a piece of land that in the second or third generation might yield a competence and a reasonable degree of comfort. Mi-

¹R. W. Cilento: "The White Settlement of Tropical Australia" in *The Peopling of Australia*, edited by P. D. Phillips and G. L. Woods, Melbourne, 1930.

grants of this type are becoming fewer and fewer in the world. The countries that are complaining most of population pressure enjoy for the most part such a level of living that their potential emigrants are rarely willing to accept the lonely, isolated, hard life of the eighteenth and nineteenth century pioneer. In this hard life a monotonous unfamiliar diet is not the least of the hardships.

To analyze in greater detail these psychological factors would carry us beyond the scope of this study. We turn, therefore, to consideration of physiological factors. There is no evidence whatever that the different races of men have qualitatively different food requirements. The human machine, whether in a white, black, red, brown, or yellow skin, always requires the same sorts of food elements: carbohydrates, fats, proteins, certain mineral salts and certain accessory food factors (e.g. vitamins). Fortunately, the proportions may be varied greatly without effect upon health, for thus a wide variety of diets is possible, and the diet may be adapted to the foodstuffs that may be available in any given region. It follows that civilized man can live, and indeed has often lived, upon the diet of primitive people. These local diets vary no doubt in quality, for differences in bodily strength and vigor of neighboring tribes may perhaps be attributed in part to diet.² Indeed, despite the undoubted inadequacy of diets in many regions with respect to permitting the best health and greatest vigor, they must all be adequate for reproduction; otherwise the aborigines in these regions would have died out. In fact, they seem nearly everywhere to be adequate in energy content. Even in densely populated China "while there are many local situations where the farm family is undernourished, for the country as a whole the total food consumption as measured in calories is adequate. There is, however, a lack of certain specific nutrients which are essential to provide a complete diet."³

²J. B. Orr and J. L. Gilks: *Studies of Nutrition: The Physique and Health of Two African Tribes*, *Medical Research Council, Special Report Series No. 155*, London, 1931.

³L. A. Maynard and W. Y. Swen: "Nutrition," Chapter 11, in J. L. Buck: *Land Utilization in China*, issued under the auspices of The University of Nanking, The China Institute of Pacific Relations, The National Economic Council, and The Central Bank of China, Shanghai, 1936.

Diets too poor in energy content (calories) seem rare and occur usually only after crop failures or during depressions. Evidence is accumulating that diets apparently adequate but not generous in this respect may over a period of years cause inadequate bodily development, possibly shorten the span of life, and possibly affect fertility. Knowledge is not yet adequate to form a judgment regarding these matters; but it may be pointed out that such defects of diet, if they occur, are to be cured by economic measures. They are not inherent in climate, or soil. This is also true of diets defective in accessory food factors (vitamins) leading to the pathological conditions known as avitaminoses. In the light of present-day knowledge they can be prevented either by growing certain food crops or by importing special sorts of food or by administering vitamin preparations, as has been done in both the Philippine Islands and in the Netherlands Indies in the case of beriberi. But whether or not these measures can be taken in any given region is again an economic question.

There are, however, regions far from the sea, usually granitic, where goiter occurs because the diet tends to lack necessary traces of iodine. This can easily be remedied by suitable administration of iodine—for example, in salt. It is possible that sometimes other necessary elements (e.g. copper, zinc, iron) may occur in insufficient quantity in the diet. Since, as in the case of iodine, the quantities needed are small, these too may be supplied cheaply. And possibly there are other regions where there are toxic elements in the soil that are taken up by crop plants and so get into the food. Perhaps those regions of the United States where there is selenium in the soil might be so classified, but with modern knowledge of physiology such factors no longer need play a determining role in the question here under consideration.

While all men, irrespective of race, require a minimum of the same food elements, requirements differ somewhat quantitatively from climate to climate, from occupation to occupation, and perhaps from race to race. The basal metabolism seems to be from 5 per cent to 15 per cent lower in tropical

than in temperate climates.⁴ Aside from this a person requires a larger supply of food energy in a cold than in a warm climate. He requires more at hard physical labor than in a sedentary occupation. The amount of food two individuals in the same environment and the same occupation need depends upon the size, shape, and composition (corpulence) of the body; and since races differ in these respects their food requirements differ quantitatively; but the differences are not great. Whether there are also differences between races in basal metabolism has not yet been finally determined,⁵ though it is not unlikely. But all these differences are quantitative, not qualitative. They determine at most how many persons may subsist in a given region. They do not determine whether they can subsist there at all and reproduce.

We come next to economic factors. These have already been touched upon in discussing the psychological aspects of the problem. The nature of the diet depends upon the character of the agriculture that is possible in the new country. Since the nature of agriculture depends in large measure, though not wholly, upon the character of climate and soil, it is necessary to examine the potentialities of the present-day world in these respects. Though this is being done for the conference in greater detail and with more skill by others, some recapitulation of the nature of the relatively thinly populated regions of the modern world may not be out of place.⁶

Let us take first the cold regions. We may at once dismiss from consideration the polar regions, the tundra. The cold forest zone, or taiga, to the south (or north) of the tundra zone offers little prospect for settlement. Nowhere has it ever supported a dense agricultural population. If occupied at all it supports a few people who subsist on fish and wild game, sometimes on the milk and meat of reindeer. There are not many more than 12,000 people in these regions of Canada.

⁴ Geld- en Productenhuishouding, Volksvoeding en - Gezondheid in Koetowinangoen, *Landbouw*, Vol. 10, 1934, p. 360.

⁵ O. Klineberg: *Race Differences*, New York and London, 1935; W. F. Donath: *Het basaal metabolisme en het minimaal benodigde aantal Calorien*, *Landbouw*, Vol. 10, 1934, pp. 278-287.

⁶ The analysis of the regional distribution of agriculture over the earth presented here is derived in large measure from studies, hitherto unpublished, by Dr. M. K. Bennett of the Food Research Institute of Stanford University, California.

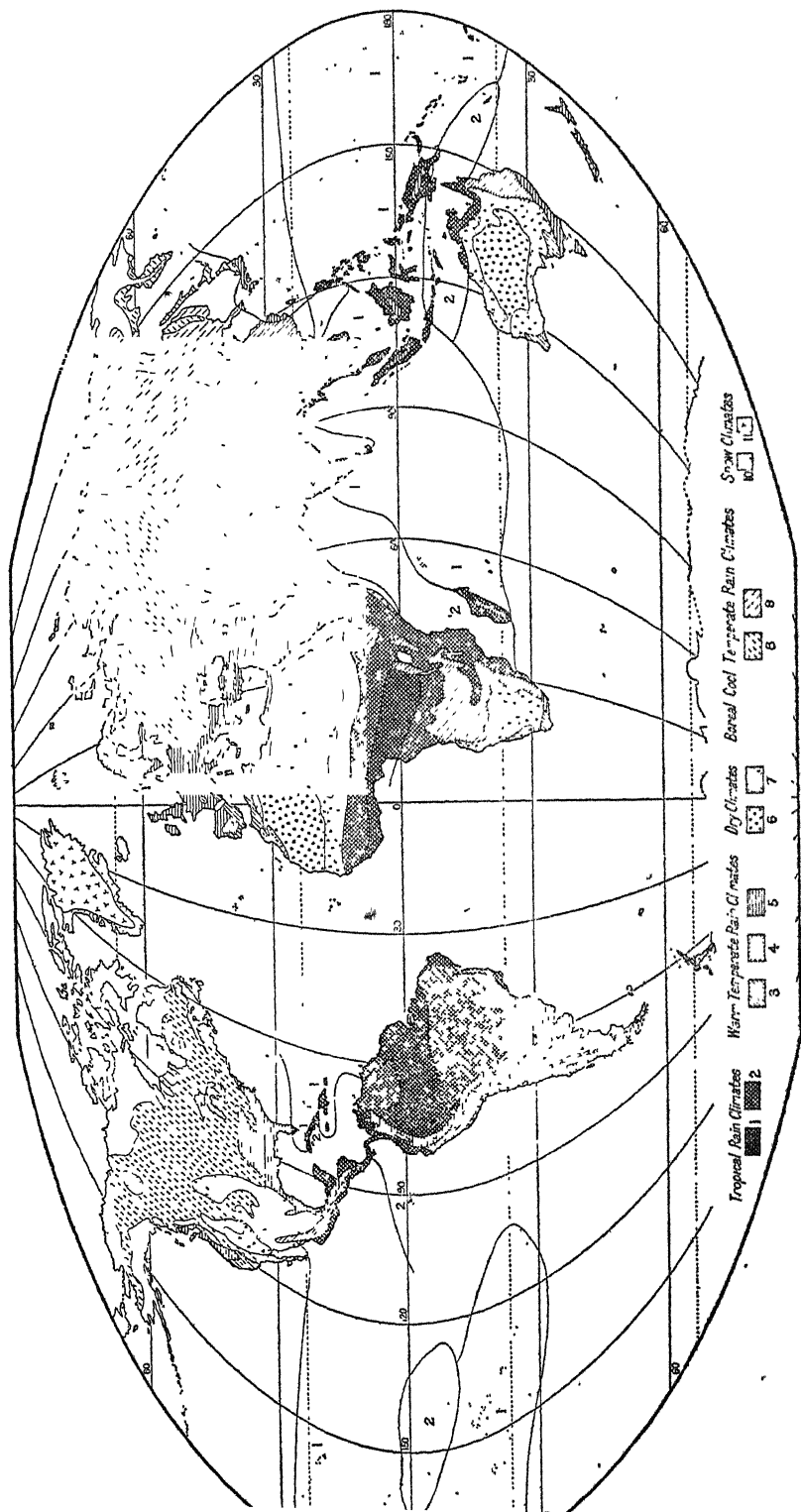
Where the warmer edge of the taiga zone lies on mountains it is put to some use in pasturing sheep and cattle. This is possible because the beasts can be driven up out of a moderate valley climate quickly and quickly brought down to it again. But pasturing does not occur extensively on the southern edges of taiga zones where there are no mountains, because too long a time would be required to drive the animals there in summer and back in winter to a place where they could stand the cold. Moreover, the pasturage is none too good, consisting largely of swamp margins. The region is better suited to a browsing animal like the moose than to grass eaters like cattle. Neither on mountain taiga nor on the taiga of the plains could a large population be supported by local food production. At best the warmer part of the taiga is a suitable place for livestock to find a limited amount of pasture in summer, and in winter it is a region best abandoned by man and beast except as industrial occupations—lumbering or mining—keep men there, supported on imported food.

Even the cold mountain and plateau territory, such as that of which there is much in Central Asia and along the Cordillera of the western hemisphere, offers but little. The population is never dense except in occasional valleys; it is not likely soon, if ever, to be dense. This land means more to man for timber, minerals, and grazing than for agriculture.

There are estimates of the land area of the earth unfit for food production because of cold weather. Baker⁷ gives estimates that imply about 10½ million square miles; Thornthwaite⁸ gives estimates that imply nearly 17 million. This difference, however, is clearly due to the fact that different bases of classification are used by the two estimators; some land that Thornthwaite classifies as too cold is classified by Baker not as too cold, but as too dry; it is really both. Thornthwaite's figure of about 17 million square miles is about 30 per cent of the total land area of the world, which itself is about 56 million square miles. Hence, solely on account of the cold, approximately a third of the land in the world

⁷ O. E. Baker: The Potential Supply of Wheat, *Econ. Geogr.*, Vol. I, 1925, pp. 15-53, and Land Utilization in the United States, *Geogr. Rev.*, Vol. 13, 1923, pp. 1-26.

⁸ C. W. Thornthwaite: The Climates of the Earth, *Geogr. Rev.*, Vol. 23, 1933, pp. 433-440.



Climatic regions of the earth in relation to plant growth (mainly after Köppen). 1, tropical rain-forest climate with rain in all seasons; 2, tropical savanna climate with dry season; 3, mediterranean climate with dry summer; 4, mesothermal savanna climate with dry winter; 5, humid climate with rain in all months; 6, desert climate; 7, steppe climate; 8, humid microthermal climate with severe winter; 9, microthermal climate with frozen soil in winter; 10, tundra climate with frozen soil in winter; 11, climate of perpetual frost.

neither is nor can be used for food production except on a very limited and in fact insignificant scale.

We come now to the hot dry areas, commonly called deserts. None of the known food plants or trees thrive in deserts except under irrigation. With more than the natural supply of water available, plants do well. They thrive in Egypt and the valley of the Indus in India, where irrigation is widely practised. Unless there is irrigation, deserts do not count as areas actually or potentially to be listed as fit for agriculture. And the fraction of them that is now or ever could be irrigated is really very small, even though they total some millions of acres.

Baker estimates the desert area of the world at about 15.6 million square miles; Thornthwaite at about 8.5 million. Here Baker includes a good deal of land that Thornthwaite classifies as too cold for food production. Their estimates of all the land unfit for food production because it is either too cold or too dry are close together; Baker's is 26 million square miles, Thornthwaite's is 25.3 million. The land too cold plus the land too hot and dry for agriculture thus probably covers no less than 45 per cent of the land surface of the earth.

We have left 55 per cent of the total, or about 30 million square miles, sufficiently warm and wet for agriculture. But within this area the adaptability of land to food production is extremely variable—it is distinctly a question of more or less, and the less bulks very large.

First, there is what geographers call semiarid land. It usually lies adjacent to deserts. It is characteristically so-called "steppe" land—much of it flat, covered with scrub and/or short grass, never covered with thick turf. The semiarid land of the world is at present the great frontier of food production. It tends to be used to graze cattle or sheep in the spots scattered through it where enough water can be found for two purposes: to carry livestock through the year and to provide winter hay grown either with or without irrigation. It also tends to be used for grain production—wheat, barley, millets—under methods of large-scale farming designed to exploit soil moisture to a high degree. It is outstandingly treacherous country. People often go in and settle and then

leave. The rainfall, never abundant, may provide water enough for several years in succession and then be utterly deficient for a period of years. In some regions, for example in northwestern China, the border of agriculture has moved back and forth with the rainfall for centuries. At best, the semiarid land of the world cannot support a dense agricultural population, either under extensive systems of livestock raising or under extensive systems of grain cultivation. It will never raise much food per acre.

Possibly it can be developed further than it now is, if only for these two uses. Great inroads have been made upon it already in the United States, notably in eastern Colorado and western Kansas and Texas. The Russians recently located most of their big state grain farms in this area. The Australians have pushed wheat cultivation farther and farther into it and so have the Argentinos. But it is not at all improbable that agriculture has been pushed farther into it than in the long run is warranted. Indeed, in some areas the world may be facing a retreat of the boundary of agriculture back into regions of more certain rainfall. Moreover, semiarid regions may be greatly damaged by overgrazing that destroys the natural vegetation. In some areas the carrying capacity of such land for sheep is steadily sinking.

Food production in such parts of the semiarid lands as are now steadily occupied has the following characteristics: (1) The principal food products are mutton, beef, wheat, and barley with considerable millet and grain sorghum; (2) the production of any of these per acre is low, because a great deal of land is required to produce grass enough to feed an animal, and the rainfall is insufficient to produce high yields per acre of grain; (3) the rainfall comes mostly in the summer over much of the semiarid land; (4) in the new countries—North and South America and Australia—food production per man on semiarid land is characteristically high, because the men who occupy the land are well equipped with capital and each man controls a large acreage, using modern machinery for grain cultivation; (5) in old countries, like Turkestan and Persia, where machine methods are not practised, production per man is not high, and the semiarid lands

tend to be the strongholds of nomadic peoples who live mainly on meat and milk; (6) the farther one penetrates semiarid and new countries, the greater the emphasis upon grazing, the less upon cultivation; and the products shipped out tend to be wool and skins and tallow rather than meat—in short, the more valuable products per pound and at the same time the least perishable products; (7) the population of semiarid lands is never dense except around mineral deposits. Nor will it ever be dense; whether in time it may be a good deal denser than it is at present it is not possible to say.

Furthermore, broadly speaking, the semiarid land near the equator is drier than land far from it, for evaporation is greater. A rainfall that is ample for permanent agriculture in the temperate zone may be entirely insufficient in the tropics. Rainfall maps alone may be very misleading to the uninitiated. Indeed there is often much difficulty in determining whether a given semiarid area is fit for agriculture. Thus there is a good deal of agriculture in semiarid Russia and but little in Africa. The reasons may be social rather than climatic or edaphic. Some of semiarid Africa has been grazed for many centuries; some now classed as desert seems to have been grazed in former ages.

Let us now consider tropical rain forest—the places where more than say 70 inches of rain falls annually, and where the rain is more or less evenly distributed through the year. Some of these tropical regions are fairly densely populated but the greater number are not. Ceylon and the western tip of Java and one or two of the smaller Philippine Islands are the only very densely populated parts of this rainy forest region—that is, with more than 128 people per square mile such as are found in much of India, China, western Europe, the Nile Valley, and the northeastern United States. Yet the density of population is considerable in other rainy regions; for example parts of Africa and Madagascar, the Malay peninsula, Sumatra, Borneo, the Celebes, and the Philippine Islands. These, however, have climates in which the rainfall is less uniformly distributed. Their climates tend to approach the monsoon type which hereinafter is termed the wet-and-dry hot climate. But much of the rest of the rain forest, espe-

cially in New Guinea, Africa, Brazil, and Central America, is quite thinly populated. This is not the place to discuss the reason for such an uneven distribution even if it were possible to do more than speculate about it.

The principal food products of these rainy tropical forest regions are never meat but always fruits, nuts, vegetables, or grains. The principal grain encountered is rice and occasionally a little maize. Maize is not easy to grow and the yields are low. It is not without significance that for the pre-Columbian Indians of much of the Amazon Basin maize was a far less important food than elsewhere in America. Cassava was more important. Rice can be grown in rain forest because it needs to have its roots covered with water during a large part of the growing season. But apparently the rain forest does not present an ideal climate for rice if one is to judge by the distribution of rice culture over the globe—perhaps because rice like other grains requires at least a minimum of dry weather toward the end of its growing season. It is the main foodstuff in the East Indies and parts of Africa. Heavy starchy fruits such as bananas and plantains are important staples; and there are many other fruits. Coconut or oil palms provide most of the fat, supplemented here and there with some milk from the water buffalo, or carabao. Fish and pig meat provide considerable of the protein. In some regions this is supplemented by special sorts of legumes. Tree crops in general are prominent, crops that require little labor other than picking. In some areas, for example Java⁹ and perhaps parts of Malaya, the culture of vegetables is sufficient. In others the necessary green-leaf foods are probably supplied to a large extent by wild plants; but in many places—for example, in some districts of the Philippine Islands—the diet is deficient with respect to green vegetables and often also fruits. Here the improvement of native domesticated or wild plants by breeding and selection is of paramount importance, or else the introduction of domesticated vegetables and fruits from elsewhere in the tropics.

It is quite impossible to say how far the rainy forests can be developed in the direction of food production. Surely the

⁹ W. F. Donath, *op. cit.*

process has to be slow, especially in comparison with what is possible on the remaining grasslands of the world. These rainy tropical forest lands are now important in the world food supply mainly because they furnish a great deal of cheap fat in the form of oil from various species of palms. Palms in a few regions are even important in furnishing starch in the form of sago. But most other tropical products can be obtained from a climate rather easier to live in, which is adjacent to the rainy tropical forests.

In this climate the annual rainfall is heavy but there is a marked seasonal antithesis. We may call it the wet-and-dry hot country. The dry spell comes mostly in the winter. Near the rain forest these regions tend to be heavily forested; farther away they tend to bear a luxurious growth of grass. There is a great deal of such grassland in South America and Africa. In general, the wet-and-dry belt has an agricultural advantage over the rainy forest in that it has a dry season free from or nearly free from rain, in which crops can be harvested and preserved. Apparently all of Java has this advantage except its western tip, while Sumatra and Borneo do not have it, and it probably accounts partly for the fact that Java is far more developed agriculturally and supports a much larger and denser population. But farther east the alternation of wet and dry weather is carried to extremes. Passing eastward along the Sunda Islands toward northern Australia the dry spell lasts longer and longer, and the wet spell becomes more and more overwhelmingly wet. The region becomes less and less populous as we pass eastward.

The wet-and-dry hot country includes extremely dense population and greatly developed agriculture not merely in Java, but also in parts of India, Indo-China, southern China, the Philippines, eastern Brazil, and the West Indies. On the average the population throughout its extent is a good deal denser than in the rainy forest. It now produces a very large fraction of the world's foodstuffs. More vegetable fat and oil come from this region than from the rainy forest region. Rice is the dominant starchy foodstuff, though cassava, plantain, and bananas are also important. Most of the world's

cane sugar, coffee, and cacao come from this region. Even the characteristically dry-land grain crops—wheat, barley, millet—are widely grown in the drier parts of this area—all these in interior India, and millet in parts of Africa. Tree fruits are numerous. All told, this region seems to contain the richest undeveloped agricultural areas of the world, which lie in South America and in Africa. The potential output of such foods as rice, sugar, bananas, palm oils, fruits, nuts, and condiments, perhaps even maize, perhaps also cattle and hogs in the grassy portions, is considerable. It is impossible to make even a reasoned guess at the potentialities, for, as above indicated, there are large variations in the distribution of the rainfall through the year. In some of the area the rainfall tends to be concentrated in two or three months while the rest of the year is rainless. In them a special kind of agriculture may have to be developed perhaps based on rapidly maturing crops (e.g. certain kinds of beans) or crops that can remain dormant during a dry spell (e.g. cassava) or both.

There is still left for consideration the temperate agricultural area. This includes the eastern part of the United States, together with the Prairie Provinces of Canada, also the Great Valley of California, and other valleys in the western United States; the central plateau of Mexico; the plains of Argentina, Uruguay, and southern Brazil; practically all of Europe; fringes of northern Africa and of southern Africa and two blocks in the interior, one in Ethiopia; fringes of Asia Minor, of southeastern and western Australia and New Zealand; a great belt of land extending through Siberia, though a good deal narrower than the uninformed suppose;¹⁰ and a great block of land in China, Japan, and Korea that extends up into Manchukuo. This is the region of cereal grains and meat animals *par excellence*, but the wet-and-dry hot area exceeds it in the production of vegetable oils, fruits, and possibly sugar. In the other agricultural regions concentration of agricultural production and density of population pretty well coincide. Not so in this temperate region. Within

¹⁰ V. P. Timoshenko: *Agricultural Russia and the Wheat Problem*, Food Research Institute and the Committee on Russian Research of the Hoover War Library, Stanford University, California, 1932.

the temperate agricultural zone there are some areas—eastern China for example—where a very dense population subsists on what it grows locally, most of the people being engaged in agriculture. In areas populated with similar density elsewhere, as in England, the population subsists to a large degree on what it imports, and it imports foodstuffs from less densely populated areas like Argentina and Australia.

Since, with the exception of the United States and a few other countries exceptionally situated, cereals contribute in terms of calories over half the food supply of a people, it seems necessary, in considering the possibilities of feeding immigrants in the regions where they settle, to appraise so far as possible the potential boundaries of cereal production. But first it is advisable to consider the trends in consumption of rice, wheat, and rye, for changes in demand may alter the situation in the future. Rice eaters on the whole seem to tend toward steadily increasing per capita consumption at the expense of barley and millets. Whether they also tend to greater per capita consumption of wheat is not clear, but in any event the absolute amounts of wheat involved are comparatively small.¹¹

Among wheat eaters the trend seems to depend upon their respective levels of living. Where that level is high the trend is usually toward reduced per capita consumption. Thus, in the United States per capita consumption of wheat fell by over 21 per cent¹² between 1904 and 1923. Where the level of living is low and the coarse grains are an important element of the diet, per capita consumption of wheat tends to rise with the level of living. In some countries per capita wheat consumption is stationary or rising; in others it is falling. Taking the world as a whole, it is impossible to say definitely whether the trend is stationary, rising, or falling. The best reasoned guess that can be made is that per capita consumption is probably not far from stationary with a tendency ultimately to decline.

Among rye eaters there is a distinct tendency for per capita

¹¹ Japanese Self-Sufficiency in Wheat, *Wheat Studies of the Food Research Institute*, Volume 12, 1935, pp. 57-100, Stanford University, California.

¹² The Decline in Per Capita Consumption of Flour in the United States, *ibid.*, Vol. 2, 1926, pp. 265-292.

rye consumption to decline and for wheat to take its place as the level of living rises. But there seems little prospect that rye will soon, if ever, follow the example of barley and oats which in many areas have become unimportant in the diet where once they bulked large in it. Rye tends rather to decline until it reaches a certain ratio to wheat, different in different countries, dictated by taste and due to the capacity of rye along with wheat to make leavened bread.

It is not likely, however, that the sort of grain that can be grown in a region has any final determining effect upon immigration into it if conditions are otherwise favorable. Rice eaters have gone into wheat regions, and wheat eaters no doubt would go into rice regions. Naturally, given a free choice, rice eaters tend to prefer rice regions, and wheat eaters wheat regions; but it is impossible to separate the dietary from the climatic influences. Since in many regions the per capita trend of rice consumption is upward whereas that of wheat is stationary or downward in others, it may be assumed that the preference of rice eaters for rice regions is stronger than that of wheat eaters for wheat regions.

We do not know whereabouts are the *potential* boundaries of the world's cereal-producing area. There are always two questions that have to be asked when one speculates about these potential boundaries. One is, what are the climatic conditions that the cereals cannot withstand? The other is, what are the regions of the earth as yet not settled by men, which nevertheless can be settled and used for cereal production when and if settled? These questions cannot now be answered, but something may be said about them.

Probably the boundary to potential cereal production, as established by drought, is clearer at present than are the other two sorts of boundaries established by cold, on the one hand, and by heat and moisture on the other. This boundary has been fairly well established by experiment by people pushing out into semiarid regions toward desert lands. It seems improbable that there is a great deal more to be learned than is already known about dry-farming methods. Yet it would be absurd to say that even this boundary of potential cereal production is really clear-cut. There is no forecasting

how far plant breeders will go in developing the plant to mature on less moisture than known varieties do. And finally, there is the economic factor. Today cereals are not grown where a yield of less than say 200 pounds per acre only can be obtained. If by increase of population the world should be forced to extend its cereal acreage, land yielding less than this, say only 150 pounds, might be put under cultivation. Then it would be possible to extend cereal acreage farther into semiarid zones than at present. The geographic distribution of crops is determined not solely by soil and climate but also by economic and social considerations.

For much the same reasons, the cold boundaries of the potential cereal-producing world are not clear-cut either. They are fairly well defined so far as concerns the southern hemisphere, where temperature is not a very important limiting factor, but not in the northern hemisphere. Plant breeders are developing varieties of oats, barley, and rye, but especially of wheat, that will mature in a shorter growing season than known varieties do. On this boundary, too, we face possibilities of changes due to altered economic conditions.

On the wet-and-dry hot side the situation is even less definite. There cannot be much doubt that large stretches of country exist in South America, Africa, and the East Indies where rice, maize, or the grain sorghums could be cultivated successfully. They are not more cultivated because people have not gone there. To inquire what are the checks that have been operative here lies beyond the scope of our analysis. If and when they are removed, as no doubt they can be if increase of population continues, it is likely to turn out in the end that cereal cultivation will have extended more into the wet-and-dry hot lands of the earth than into the dry or cold. But if wheat and rye eaters settle these regions they will of necessity be forced to modify their diet, to shift to rice, to maize, to grain sorghums, or to cassava, etc.; or they will have to produce for sale and import the sorts of food-stuffs to which they have been accustomed. Food importation is taking place on the rubber plantations of Malaya. In this way custom and food habits may play a large role in originating international trade, determining the commodities ex-

changed, and directing the course of their flow. Only to the extent that importation of rice may be difficult would rice eaters have an advantage in the wet-and-dry hot regions as well as in rain forest, for in both rice can usually be grown but not wheat or rye.

The rice eaters have another advantage in that many of them tend to have a lower standard of living than wheat eaters, and rice is a crop that requires much labor and but little machinery. But it need not be so, for in California large yields of rice are obtained on land prepared, sown, and harvested by machinery. Experiments have been made in Sumatra to grow rice according to the California technique. They were not successful, but it is believed in competent circles that this was due not so much to inapplicability of the American technique in Sumatra as to mistakes of judgment and management. We encounter here the need for capital if people with a high standard of living are to develop new lands.

We now need to return to consideration of actual occupation of land in relation to potential. It was pointed out above that 30 million square miles or less of the earth's surface lies outside the cold and desert zones. This 30 million square miles we have divided into four categories: the semiarid, the rainy hot forests, the wet-and-dry hot country, and the temperate agricultural areas. It is not possible to estimate how much land is in each of these categories. It is not even possible to estimate with any considerable degree of exactness how much of the earth's surface is now actually used as arable land or as pasture that would be transferred into arable land merely by plowing. Such estimates as we have indicate that it probably amounts to something between 5.5 and 6.0 million square miles. When we attempt to estimate the extent of the land not now used for agriculture but potentially arable we encounter even greater difficulties; for not merely are adequate statistical data lacking, but the very concept "arable land" is a relative one. Where climate does not absolutely forbid, whether a given piece of land is brought under the plow is really an economic not an agronomic question. Hill-sides may be terraced, and swamps drained, but only by the expenditure of a great deal of labor or, what comes to the

same thing, of capital. We shall have more to say shortly of the dependence of food production upon capital.

The best reasoned guess that can be made is that under existing circumstances perhaps somewhat less land than is already in use might be added to the arable land of the world, making a total of about 10 million square miles of land that is already in use or that might be hoed, spaded, or plowed. The population of the world is about 2 billion persons. Ten million square miles is equal to 6400 million acres; consequently, on this basis of estimation, each person could have 3.1 acres of arable land. In addition, each could have more or less agriculturally productive land not arable, to use for grazing or for tree crops. We cannot say how much, but probably about as much as he could have of arable. This amount—let us say 6 acres all told—would be sufficient and in fact more than necessary, even though it sounds like very little, for at present the world gets along without using as much as 2 acres of arable land per head of population.

There is, then, for the present, room enough in the world; and a redistribution of population is conceivable such that each family might have enough land to feed itself. It is doubtful, however, that it is desirable to convert all or most of the peoples of the world into self-sufficient farmers, even if it were possible; for a self-sufficient farmer would be about as much use to society as a corpse, were it not for the fact that he produces children. While the children of immigrants may be of the utmost value in the new country, they are of no value to the homeland. Otherwise, indeed, the subsistence farmer may be of even less use than a corpse, for he occupies land that might be better employed. Placing him upon the land involves the withdrawal of a large amount of capital from use by society. He may not even produce enough children for his own replacement. At best a surplus of children is all that he produces for society; but in some societies this may be sufficient justification; for example, societies with a declining birth rate. It will also seem sufficient justification to those who desire more cannon fodder. Furthermore, the subsistence farmer does not consume. Therefore, to put people back on the land in order that they may be self-sufficient and

to use large capital sums in doing so is short-sighted national policy. *Ex hypothesi*, the capital thus locked up cannot yield a return and probably never can be recovered: it is gone. If the capital is to yield a return it must not be devoted to subsistence farming, for the farmer can pay interest and amortize the debt only if he sells, i.e. ceases to be a subsistence farmer. But this he cannot do if farmers already on the land cannot flourish unless the new farmer has better land or is more skillful. In that event other farmers suffer. Therefore, instead of putting men on the land to practise subsistence farming it would be better to employ such men on public works, or put them on the dole, or give the aged larger pensions, or spend more of the national income on unemployment insurance. This would be less wasteful of capital.

Of course, in practice no politician would advocate such action; his policy would be some sort of compromise. If, nevertheless, the matter is presented here it is because the International Studies Conference at the present session may be presumed to look at migration from the point of view of the homeland. It asks what benefits might be conferred upon the homeland by emigration? It becomes obvious that to settle emigrants in foreign lands as mere subsistence farmers can be of little service to their native land, for they will not produce food or raw materials for it; they will buy none of its manufactures; they will make no tourist expenditures on visits home; they will make no emigrant remittances to it. Indeed, they perform a disservice to their native land to the extent that in the process of emigration and in establishing themselves in their new home they drain away capital. They perform no positive service to the land of their birth—only a negative service if they leave empty places.

To examine the utility of such places in detail lies beyond the scope of this paper. It would be necessary to examine certain questions that have not as yet been answered fully by students of population. Thus, it has been usual in studying emigration to deal with absolute numbers, whereas not the absolute number of emigrants is significant but rather the percentage they represent of the total population of the motherland. It would seem important also to know from what social

classes the emigrants come. Thus in Japan only in agriculture would there seem perhaps to be overpopulation.¹³ Emigration of Japanese farmers would therefore have greater repercussions than of industrial workers. Furthermore, in two countries with different age distributions the places left by emigrants would be filled in very different ways, and the reactions might be quite diverse. In a country with a declining birth rate the effects of emigration upon population increase must be more pronounced than in one with a stationary or increasing rate—indeed in the first case the effects may seem highly undesirable to many persons. But all these questions and many others have as yet been studied inadequately. Perhaps, excepting the cases in which emigration represents a very appreciable percentage of the total population, all one is justified in saying, for the present, is that it is very doubtful that emigration is a remedy for so-called overpopulation, whether real or imagined.

But this is not the place to analyze such questions as these. Enough has been said to indicate that it is very dubious that the settling of emigrants as subsistence farmers upon land outside the national boundaries is of any considerable service to the mother country. On the contrary, it may be a distinct disservice. It follows that in analyzing the consequences of diet and food production by immigrants subsistence farming may be left outside our consideration.

We must, therefore, consider only immigrants who go on the land at a distance from their home to produce not merely for their own consumption but also for sale or exchange. But this renders them to some extent independent of the diet that prevails where they settle, because they are in a position to exchange some of their own surplus for imported foodstuffs. The importation of such foodstuffs may, after the immigrant has established himself, tend to be considerable. This occurs in the United States, where each national group tends to import some of the foods to which it had been accustomed at home. Italians, for example, import olive oil, tomato products, and special sorts of alimentary paste, cheeses, and

¹³ E. F. Penrose: *Population Theories and their Application*, with Special Reference to Japan, Food Research Institute, Stanford University, California, 1934.

wines; Scandinavians, fish and cheeses; Greeks, olive oil, olives, special sorts of canned vegetables; Japanese, their own type of semiglutinous rice, fish preparations, special sorts of canned vegetables, seaweed, and special condiments. This does not last very long because the immigrants' children tend to adopt the general manner of life of the new country, including its diet.

But immigrants may settle in regions that are empty or only sparsely occupied by primitive tribes unacquainted with agriculture or practising a very primitive form of it. In a country without established agriculture the immigrant will be forced to produce most or all of his food. He may do so to a large extent by hunting, but the time may come when the population is too great to subsist in this way. Whether it comes soon or late depends upon mortality conditions. The immigrant must then import his food or turn to agriculture. Then the form of agriculture depends upon climate and soil. He first attempts to introduce the crops of his homeland. If these succeed there are no dietary difficulties of a qualitative sort. He has much the same sort of diet he enjoyed at home. This is what happened very largely in Australia.

If the climate and soil are such that the home crops do not succeed, the immigrant must experiment with others; but it is astonishing how tenaciously the crops of the aborigines hang on. Somewhere in the Americas practically every European crop succeeds, yet the principal pre-Columbian grain crop, maize, still occupies more land than any other; only now it has become—at least in North America—a feed crop rather than a food crop. The pre-Columbian natives had little use for feed crops, for they had few domesticated animals (llama, guinea pig, turkey, Moscovy duck, dog). It is even more astonishing that peoples sometimes make great sacrifices (apparently primarily for psychological reasons) to continue to grow a crop when they move into territory not suited to it. Thus, the Japanese cultivate rice on the island of Hokkaido and in the northern prefectures of the main island, where it is really too cold for a tropical crop like rice and where a cold summer may cause crop failure.

The need to experiment with a strange crop presents dif-

difficulties and in the past has held up settlement for a long time. This is not likely to occur in modern times with much scientific knowledge concerning the different forms of agriculture practised in the different regions of the world. Queensland is perhaps a case of this sort, where English farmers are establishing themselves with crops like sugar cane, wholly unknown in England.

After these general considerations we come now to consideration of food production and diet possible in those regions outside the temperate agricultural zone in which we have learned there is opportunity for settlement, viz.: (1) the semiarid area, (2) the tropical rain forest, and (3) the wet-and-dry hot area. On the assumption that the immigrant produces all the food he consumes in his new home, what difficulties will he encounter in the matter of food supply in the several areas?

In the semiarid area, as above pointed out, there should be few dietary difficulties. There would be available grain—wheat or barley or rye or grain sorghum—and meat and milk. In most regions there would be enough water to irrigate a small garden. The immigrant could thrive very well on such a lacto-vegetarian diet. In the colder portions of semiarid areas there would be a scarcity of fruit—especially tree fruits, apples, peaches, pears, plums—and this might be felt as a real hardship by emigrants from western Europe. There might also be a scarcity of fresh vegetables in winter; but it should be possible to produce enough root crops, potatoes, turnips, etc., to avoid any danger of scurvy. Moreover, with our modern knowledge of diseases of the scurvy type, the so-called avitaminoses, there should be no difficulty in shipping in the necessary supplemental foods, or administering concentrated vitamin preparations. It would be easy to ship in the necessary small volume of required supplemental foods because our immigrants would not be subsistence farmers; they would be producing for a more or less distant market—probably grain, wool, possibly meat and dairy products—so that there would have to be means of transportation to market. Since many of the semiarid regions tend to lie in the

interior of continents in glaciated territory they sometimes tend to be goiter regions.

In semiarid regions, as already pointed out, food production per unit area is small; therefore each farmer must cultivate a large acreage if it is not irrigated. The difficulty of doing so under a system of primitive agriculture is probably one of the major reasons why so much semiarid land has remained so long uncultivated. Much of it can be cultivated profitably by means of mechanized extensive agriculture.¹⁴ For a peasant without capital this is quite out of the question; he cannot spade or hoe enough land to produce sufficient food to support a family. Even with a draft animal and a primitive plow, life on such land is most hazardous; for crop failures are frequent. The peasant starves if there are two such in succession, or he abandons his farm. Yet the corporation or the capitalist may cultivate such land; the recurrence from time to time of crop failures is for them merely an element in the cost of production.

The reason why this apparently extraneous question is introduced here is to emphasize the fact that colonization on semiarid land requires the employment of relatively great amounts of capital for relatively small numbers of colonists. As soon as capital becomes cheap enough or, what amounts to the same thing, when agricultural prices rise high enough relative to other commodity prices, many regions—for example northwestern China—will probably be cultivated that are now devoted to extensive animal husbandry. The boundary between cultivated crop and pastured wild grassland in some semiarid places has shifted back and forth through the centuries. The advance and retreat of cropping is commonly attributed to weather cycles, but it may well be that sometimes in some places price cycles also have played an important part in causing the retreat of agriculture from steppe lands.

The point that interests us here is the need for capital in settling emigrants upon semiarid land. It requires capital first to move the emigrant, then to settle him upon the land,

¹⁴ This is the farming system of the Great Plains area of North America (both United States and Canada) and of the newer wheat regions of U.S.S.R.

and finally to maintain him there until he has developed his land to the point where it yields him all that he requires for sustenance and a surplus for sale. His very passage money, if he sails on a foreign-owned vessel, is tantamount to the export of capital which may or may not be advantageous to the mother country. Whatever he takes with him is export of capital. Once arrived abroad some one must build a house for him. Unless he merely becomes an agricultural laborer someone must furnish him with tools, draft animals, and machinery, assuming he gets the land without cost as he did commonly in the past. But to make his employment possible at all requires that someone furnish the funds to develop the new territory, to build roads, railroads, or canals, or canalize rivers; to build schoolhouses, hospitals, jails; and to pay the police. The immigrant's own savings will not be enough for all this. If his homeland does not furnish the capital, then some other land must. In that event, the immigrant's exportable surplus, which must pay for and amortize these borrowings, will not go to the homeland.

The experience of Western Australia illustrates the cost of settlement very well. "This State undertook to place 6000 settlers with their families on farms of their own at an estimated cost of £ 6,000,000, excluding passages: the Commonwealth government was to raise the necessary loans and the British government agreed to contribute a sum equivalent to one-third of the interest on the loan for a period of five years. 1352 settlers were introduced under this scheme in the heavily timbered south-western district. The scheme was prosecuted for two years but with disappointing results. According to a Royal Commission, which reported on the undertaking, the farms which the state undertook to provide for £ 1000, were costing between £ 1400 and £ 1500, a sum considerably in excess of their market value; the British settlers were inexperienced, and had not been tested in agricultural work before selection. The relative failure seems to have been due to errors of administration."¹⁵ To be sure, the settling of people with a lower level of living than that of Eng-

¹⁵ A. H. Charteris: "Australian Immigration Policy," in *The Peopling of Australia*, *op. cit.*, p. 99.

lishmen in a country with lower living levels than Australia might be less costly; but capital requirements would nevertheless still be quite large.

Capital requirements today are greater than in former times. The hard-working immigrant type of the past is gradually disappearing, in part because the level of living is higher, in part because the background of many prospective emigrants is not the same as it was in former times when most of them tended to be agricultural laborers who went into agriculture in new countries or into industry as unskilled laborers. To look at emigration out of Europe without examining at the same time migrations within Europe gives a misleading picture. Emigration beyond seas has been but a part of a more general shifting of peoples. The farm laborer has had alternative paths: overseas or into industry in Europe. Today, for the most part, the countries complaining of population pressure are industrialized or, like Japan, industrializing. In some of them prospective emigrants are to be found predominantly among industrial workers.

But it is doubtful that the industrial worker can be induced in numbers to accept the lonely isolated hard life of the eighteenth and nineteenth century pioneer. It is doubtful that he will succeed if placed upon the land, as experience teaches. A subsistence-farming existence without near neighbors or roads or schools or an eight-hour day does not attract him. He must be given conditions that at least approach the level of living to which he has been accustomed. But in the unsettled semiarid regions of the world this would require capital—much capital. Not many countries are in position to export the vast amounts of capital that would be necessary to induce such numbers of their nationals to emigrate as would be sufficient to relieve in any notable degree real or imagined population pressure at home. Perhaps they could borrow it. But it is an open question whether, even if such a volume of capital were available for export, it would be in the best interests of industrialized countries desiring, wisely or unwisely, to foster emigration to employ much capital in this way. The question should in each case be asked whether this capital might not be more wisely applied at home in industry so as

to furnish employment and raise the domestic standard of living, while permitting such emigration to take place as would occur naturally without public assistance. If emigration is subsidized with borrowed money then much of such benefit as might accrue to the mother country would go to the creditors. But this, nevertheless, may be advantageous; it may lay the foundation for triangular trade—with the mother country at one of the corners. Also, there remain some of the advantages of a colony to a metropolitan country such as the spread of its language and culture, the fostering of special types of production, employment for its professional and entrepreneurial classes, and the enjoyment of prestige for whatever that may be worth. Otherwise, economically speaking, a colony is of doubtful value to a country unable to supply capital.

In the rain-forest regions the dietary difficulties would be far greater for immigrants from the temperate agricultural zone than in semiarid regions. In such regions none of the temperate-zone crops flourish except rice, which is not typically a temperate-zone crop. Rice-eating people from temperate regions, like the Japanese, might in this respect have a psychological advantage. Too little is known of the diet of rain-forest dwellers. One is forced to infer the character of the diet from the sorts of foods that are consumed. On the whole, the native diet where the population is at all dense seems to contain more carbohydrates than is desirable and too little protein. In many of these regions the diet is notoriously monotonous, and in many there is a tendency to overcome this characteristic by the use of sharp spices and strong condimental flavors. Sometimes the same effect is sought through alcohol. When one considers the great monotony of the diet of many primitive peoples in the tropics, their avidity for the white man's distilled liquor appears understandable and less like an inherent defect in the native's character. But there is also, perhaps, another explanation for the highly spiced and flavored food of the tropics. It is that the human body endeavors to adapt itself to a warm humid climate by reducing its heat production. Since the body's heat is derived from the combustion of food in metabolism, less food is taken: there is loss of appetite. This loss of appetite may go to the

point where not enough is eaten to maintain body weight: one grows thin. Hence the artificial stimulation of the appetite by sharp food or alcohol. The main difficulty in the diet seems to be a lack of suitable protein: the diet tends to be too completely vegetarian—rice, cassava, plantains, sweet potatoes or yams furnishing most of the carbohydrates; palms the oil, and a few nuts, or legumes and a little meat or fish the proteins. But the diet is also very defective with respect to protein in many other regions, especially among rice eaters. This, however, it should be possible to avoid by suitable adjustment of food production in the light of modern knowledge of nutrition provided incomes are high enough.

Concerning other climatic effects on health encountered by temperate zone people in the tropical rain forest nothing will be said here; it lies outside the scope of this inquiry. Whether or not white men can live there in numbers and maintain themselves is a matter not here discussed. So far as diet is concerned nothing insuperable stands in the way, although far greater adjustments need to be made by immigrants than in semiarid regions. Since intensive farming is possible where the soil is good, immigrants may perhaps be put upon the land in some places with less expenditure of capital than in semiarid regions. On the other hand, in many regions there would have to be extensive costly forest clearing and drainage operations. The costs cannot even be guessed at, for close settlement has not been attempted in recent years. In any event, the process would of necessity be slow, and these lands are not likely to prove attractive for settlement until other drier regions have first been filled up.

We now come to the wet-and-dry hot country. Here the potentialities are considerable, but are they to be exploited by temperate-zone people or by the races already on the ground? Possibly these races will ultimately fill this land—certainly in Asia, probably in Africa, possibly in South America. It is a land for intensive agriculture even on plantations established by Western capital and under Western management. On Java sugar plantations one may see native women irrigating the sprouting seed cane by dipping water out of the irrigation ditch and emptying it out over the field. It is a zone where,

under scientific management, more food may be produced per unit area than perhaps in any other agricultural area, special districts in the rain forest perhaps excepted. This being so, capital and machinery count for less than they do in the semi-arid agricultural zone and probably also than they do in the rain forest. Although the native has little or no capital, he is not at as great economic disadvantage *vis-à-vis* the immigrant as in semiarid regions. It is labor, perhaps, more than capital, that counts.

If men from economically advanced countries are to settle in rain-forest and wet-and-dry hot regions they must create living conditions in which they can multiply. But such conditions at the same time accelerate the increase of the native, and the immigrant has to face competition with the native in birth rate. In the past in some regions the colonizing white man introduced disease or unwise administration or exploitation, which checked population increase; as, for example, in certain Pacific islands. In others he had little effect on the incidence of disease; and there peace, order, and above all sanitation, imposed by colonial administrators, caused the population to increase by leaps and bounds. Thus the population of Java increased from between three and four millions in 1815 to thirty-five millions in 1925. In many places the white man played the role of dry nurse to the blacks and browns. There tens of millions live their span who, but for the white man's technology and police, would never have been born. Then the time comes when the native is so numerous that he has not enough land for his subsistence. A dangerous struggle may develop between the immigrant or his descendants and the natives in their struggle for subsistence. It is a situation likely to be faced in the end if the rain-forest or the wet-and-dry regions are to receive any considerable influx of migrants.

Two types of policies have evolved for such regions. One has as its ultimate goal to develop the native into an independent landowning farmer and to preserve such portions of the indigenous culture as may be compatible with a monetary economy in a competitive world. It seeks to encourage the native to exploit his own country's natural resources as

rapidly as possible rather than to have them exploited by imported capital to the end that in the long run there may arise a native population, loyal to the metropolitan country, with a reasonably high standard of living, and hence requiring large quantities of manufactured goods in exchange for agricultural and other raw materials. Its cornerstones are: prevention of the alienation of the natives' lands and the importation of capital only for such enterprises as are of mutual benefit to native and capitalist. Progress under this policy is of necessity slow, but it should in the end preserve the native from becoming a landless agricultural laborer or a proletarian factory worker.

The second policy seeks to develop the country as rapidly as possible. Capital is poured into it to establish plantations, even if land must be alienated, and to exploit mines and forests even if natural resources are used up. Then there is something to tax; and revenues are available to build roads and pay doctors and schoolteachers; there is freight for railroads; there is employment for native labor; the level of living goes up; and there is an increasing market for manufactured goods. The benefit to the native is not postponed to the distant future. However, while the country develops rapidly under this policy the level of living of the native tends to rise but slowly. On plantations with European management the native tends to learn only what he is taught as a plantation laborer. Sometimes, as in the case of rubber, this is useful to him; and then he becomes a serious and indeed an irresistible competitor of the Western-managed plantation. More often what he learns is of little help to him in improving his own farming technology. Upon such land as remains in his control he continues to practise his traditional subsistence farming; that is, each family produces all, or nearly all, that it consumes. Efficiency of production is low, for the efficiency that comes from division of labor and exchange of products is lacking. The native tends only slowly to raise his efficiency and productivity through specialization which has been at the bottom of most forms of economic progress in the last century or more. He continues to grow his food crops whether or not his land is better suited to the production of some

other crop, which he might sell for more than enough to cover the purchase of what he needs. The level of living remains low, for he is ordinarily unable to produce a surplus for sale; and in consequence there is little left over with which to raise his own level except, possibly, what he may achieve as a worker upon a near-by plantation.

The ultimate outcome is likely to be a China teeming with millions who tax domestic production merely to be fed, who look with hungry eyes upon the lands of the plantation, and who in the end will not be gainsaid. While developments like these are perhaps in the lap of the distant future, it is nevertheless worth while to consider what circumstances, if there be such, might prevent these countries from becoming economic units with a low level of living and but a small share in the world's trade. These circumstances are of two sorts: economic and biological. To increase food production by hand labor demands the use of the very best land, for it alone gives high enough yields to feed the laborer and his family, to say nothing of the production of a surplus. But machines eat no food. The law of diminishing returns takes on a new aspect when the increment of work applied to the land is that of machine labor—especially if it means a more intensive crop.¹⁸ The native might produce a surplus and cultivate a poorer quality of land if he could get machines and were taught to use them. But this requires large capital outlays which the native cannot make by himself. If he can produce a surplus the biological factor will come into play, *viz.* elevation of the level of living. If the advancement of the level of living in the rain-forest and wet-and-dry regions can be made reasonably rapid, there is every cause to believe that the native would ultimately lessen his rate of increase, for this has happened or is happening where the level of living is relatively high. We need not concern ourselves here with the question why this is so or by what means the reduction of the birth rate is brought about. It is clearly, in the long run, in the interest of colonial powers to strain every effort to raise the native's level of living rather than to exploit him. This means no alienation of land, the kind of education that will make

¹⁸ F. Aeroboe: *Agrarpolitik*, Berlin, 1928, Chap. I.

of him a better farmer rather than a poor imitation of a white-collar worker, an appropriate rural credit system so that adequate capital may be made available to him, and, above all, the creation of a middle class, which is usually lacking in these countries.

We see here again that large capital outlays for immigration are needed and further large capital outlays if the native is not in the end to overwhelm the immigrant by sheer force of numbers. There are wide possibilities from the standpoint of food production for redistribution of population, but not merely must the immigrants and the land be available but also in the present-day world large volumes of capital. Take Japan, for example, with an annual population increase of not far from one million souls. Where would she find the ships to move a number of emigrants large in proportion to her increase? Where would she find the capital to build them houses, furnish them tools and the social services to which they have been accustomed, and supply them sustenance while they were preparing the land and until they harvested a large enough crop to maintain them? The analysis of questions like these in all their implications lies outside the scope of this report; they are raised here because questions of diet and food supply are inextricably intertwined with them.

CANADA AS AN AREA FOR SETTLEMENT

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IN EACH of the years 1935 and 1936 there were admitted into Canada some 11,000 immigrants. If allowance is made for the number of Canadians emigrating to other countries, particularly to the United States, the net immigration is seen to be negligible. To find immigration of such small proportions as has characterized the past two years, one must go back a century or more in Canadian history to the period when the colonies of British North America were insignificant in population and at a relatively low stage of economic development. In a country in which the problem of settlement has been continuously in the forefront for at least three centuries, so low a level of immigration must necessarily give rise to serious consideration of the related problems of immigration and settlement and of the part which Canada can play or is likely to play in the world movements of population.

It would be a great, though all too common, mistake in this, as in other fields, to assume that low points reached in cyclical fluctuations marked the beginning of a new and completely different era. The simple explanation of the condition is the true one. Extreme depression and stagnation of economic activities have reduced the attractiveness of settlement for the time being, and neither the governments of countries from which people emigrate nor those of countries to which people immigrate are desirous of taking the responsibility for encouraging transfer under such conditions. It would, then, be foolish to expect the rate of immigration and settlement in Canada to persist at present levels. There is no indication that this phenomenon, which has been so important a factor

History of Immigration and Settlement

As the unfavorable conditions of the 1890's gave way to the favorable conditions of the 1900's, agricultural settlement in the Prairie region rose rapidly, and the country once more embarked on large transcontinental railway construction projects, specifically the Canadian Northern Railway System and the National Transcontinental-Grand Trunk Pacific Systems (Figs. 2-5). The agricultural settlement of this period is that it was settlement of a grassland area of



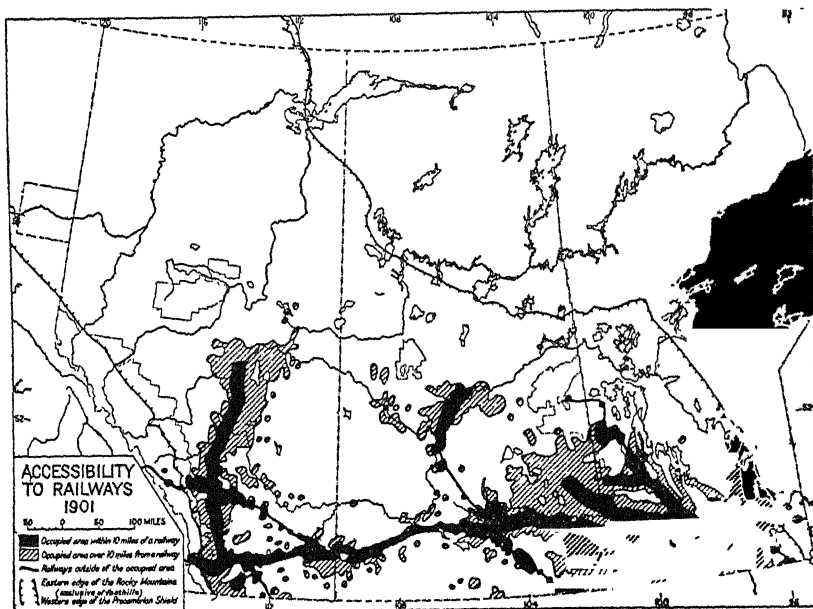


FIG. 3

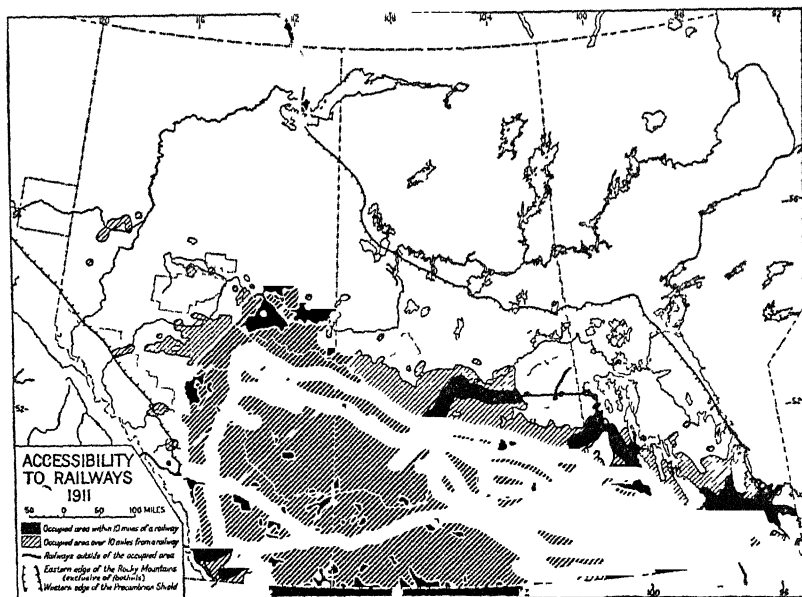


FIG. 4

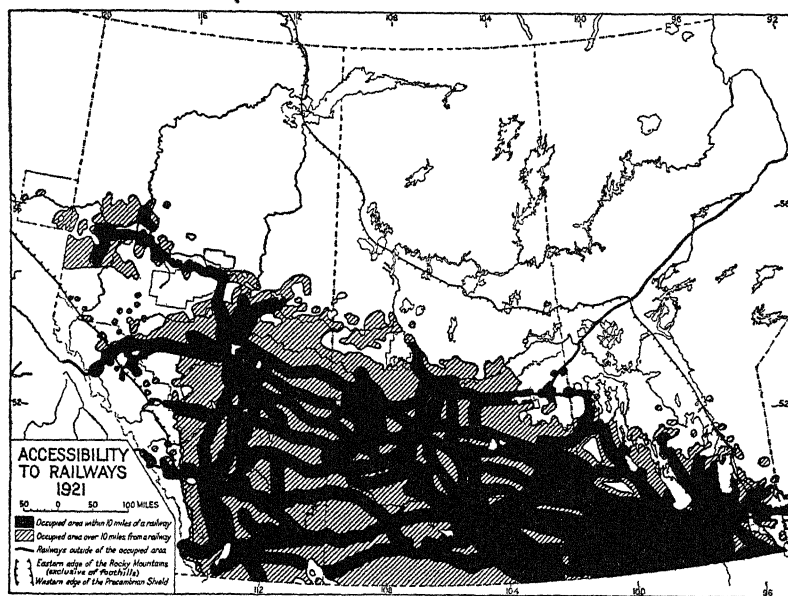


FIG. 5

FIGS. 1-5. A series of maps showing the relation of railways to the distribution of the rural population in the Prairie Provinces from 1886 to 1921. Accessibility is indicated by means of bands 20 miles wide enveloping the railway lines, 10 miles from a railway marking a primary economic zone.

The year indicated in each map refers to June for the census on which the population distribution is based, and to December of the preceding year for the extent of the railway net. Railways are based on manuscript maps provided by the National Development Bureau, Ottawa; population is based on the quinquennial census published by the Dominion Bureau of Statistics, Ottawa. The settled area, shown from 1901 on, is outlined from the township population figures of the census. (Courtesy of The Macmillan Company of Canada Limited.)

which there had been no counterpart in Canadian history. The very ease of settlement contributed enormously to its rapidity, and the movement attained a volume that could not be hoped for under different circumstances. Under the stimulating effects of rapid agricultural settlement and active railway construction, immigration rose rapidly to an average of over 200,000 a year and to a peak of 402,000 in the year 1913.

The volume and speed of immigration and settlement in this period have given an exaggerated view of what is possible. The circumstances of the period, as has already been mentioned, were peculiar to a degree; not only was there a favorable conjunction of agricultural settlement with railway construction, but the agricultural settlement was in an area in

TABLE I

NUMBER OF IMMIGRANT ARRIVALS IN CANADA FOR CALENDAR OR
FISCAL YEARS 1870-1936¹

<i>Year</i>	<i>Number (thousands)</i>	<i>Year</i>	<i>Number (thousands)</i>	<i>Year</i>	<i>Number (thousands)</i>
1870.....	25	1892. . . .	31	1914.. . .	367
1871.....	28	1893.....	30	1915.....	127
1872... .	37	1894.....	21	1916....	37
1873.....	50	1895....	19	1917.....	65
1874.....	39	1896.. . .	17	1918... .	66
1875.....	27	1897... .	22	1919.....	49
1876.....	26	1898.....	32	1920 . . .	108
1877.....	27	1899. . . .	45	1921....	139
1878. . . .	30	1900.....	24	1922....	82
1879....	40	1901....	49	1923.. . .	67
1880.....	39	1902.....	67	1924. . . .	145
1881.....	48	1903.....	128	1925.....	111
1882....	112	1904.....	126	1926.. . .	96
1883. . . .	134	1905. . . .	143	1927.....	144
1884. . . .	104	1906.....	184	1928. . . .	152
1885.....	79	1907. . . .	122	1929.....	168
1886.....	69	1908. . . .	257	1930.....	163
1887.....	85	1909.....	141	1931.....	88
1888.....	89	1910.....	196	1932.....	26
1889.....	92	1911.....	295	1933....	20
1890.....	75	1912. . . .	335	1934.....	14
1891.....	82	1913....	383	1935.....	12
				1936... .	11

which land could be converted from its natural state into farms at a speed not attainable in any other region. So different have the conditions of immigration and settlement become that it is folly to look at the high figures of the prewar period as standards of what can or ought to be attained in a different world.

During the war years, of course, while the settlement of the land, under the stimulus of high prices for agricultural products, proceeded apace, immigration fell to low levels, and it was confined very largely to entrants from the United States. In the decade of the 1920's, however, there was a substantial recovery, and on the average about 100,000 immigrants entered yearly. The peak figure of 168,000 was reached in 1929. This movement was associated with renewed agricul-

¹ *Canada Year Book*, 1936.

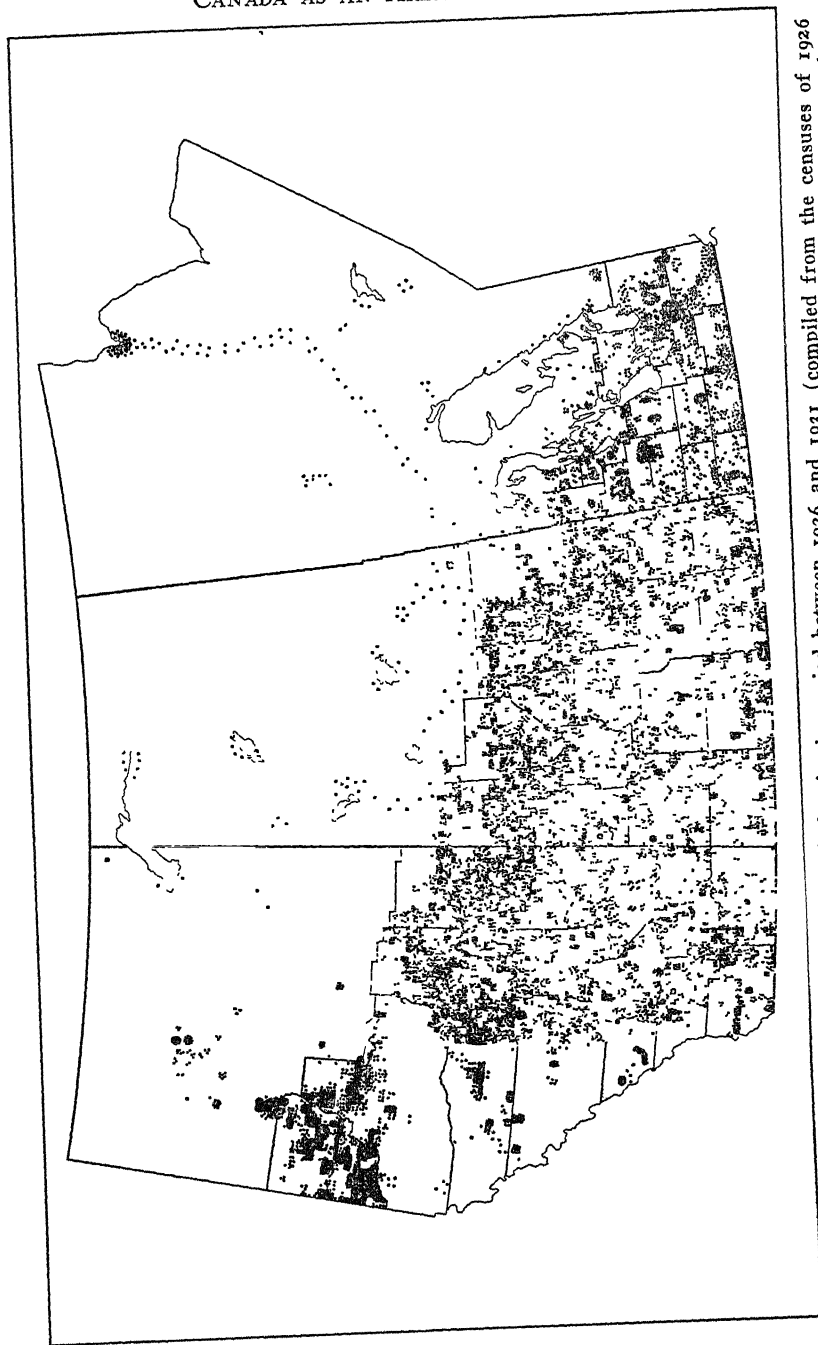


FIG. 6. Map showing increase of rural population in the period between 1926 and 1931 (compiled from the censuses of 1926 and 1931). Each dot represents 10 persons. The territorial unit is the township. The dots in unorganized territory have been distributed according to the best information available. (Courtesy of The Macmillan Company of Canada Limited.)

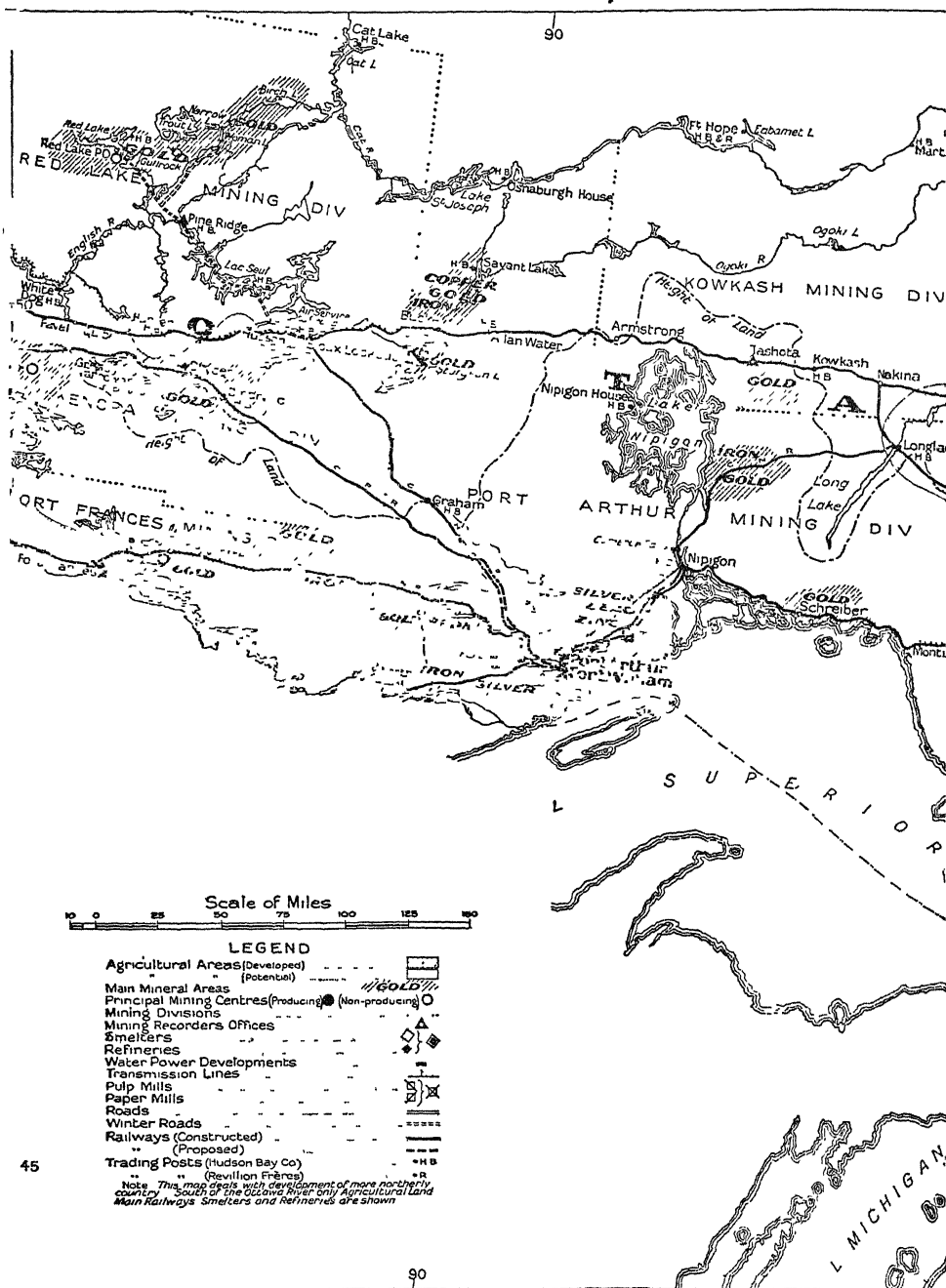
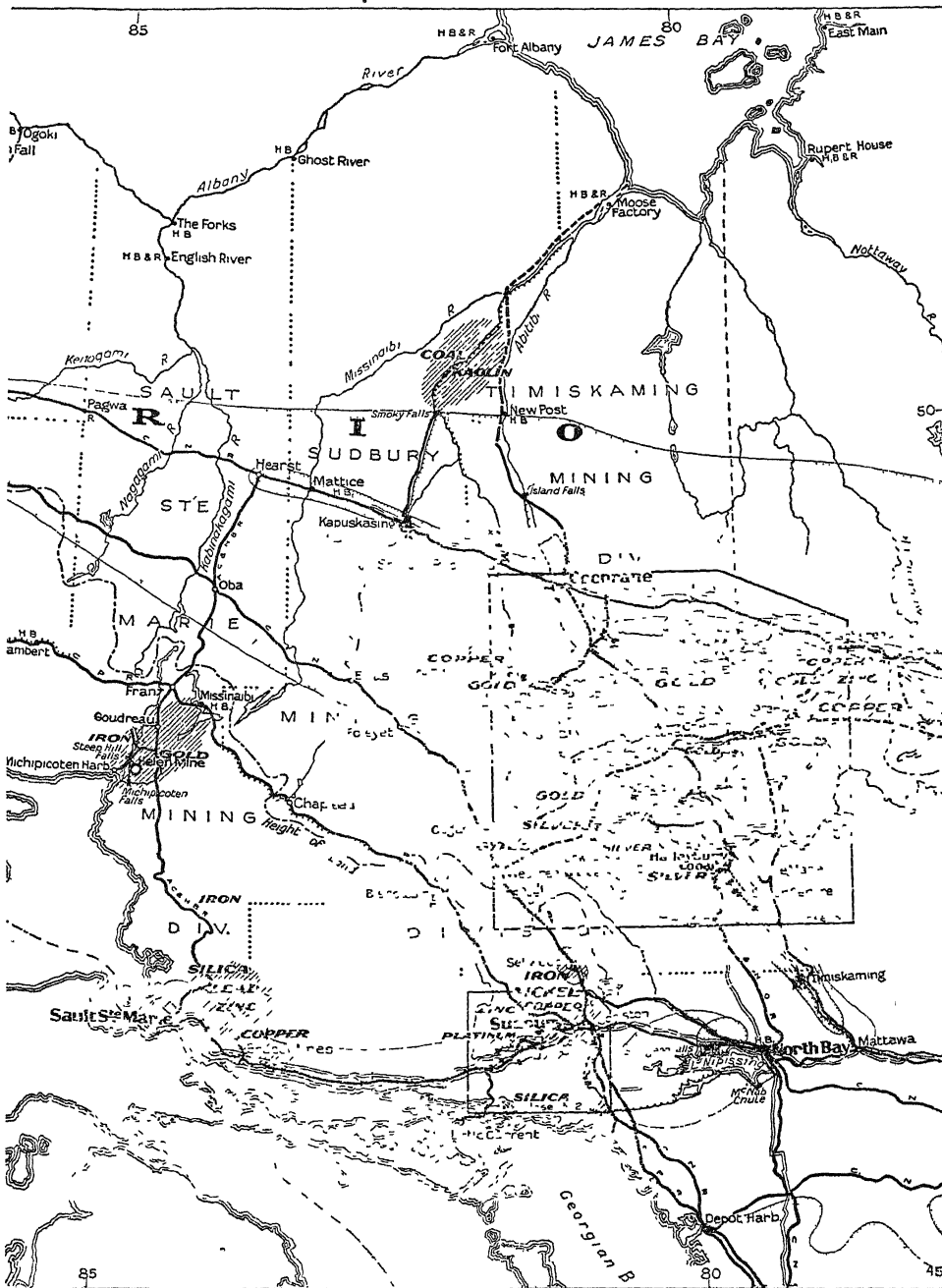


FIG. 7. Map of Northern Ontario showing mining and agricultural districts (National



Development Bureau). (Courtesy of The Macmillan Company of Canada Limited)

tural settlement, particularly along the northern borders of settlement in the provinces of Manitoba, Saskatchewan, and

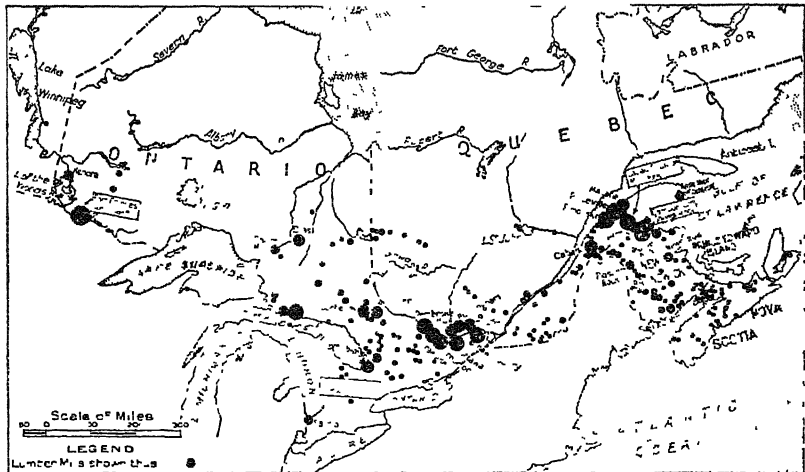


FIG. 8. Lumber mills in Eastern Canada. The relative size of the circles indicates the mill production by districts (National Development Bureau). (Courtesy of The Macmillan Company of Canada Limited)

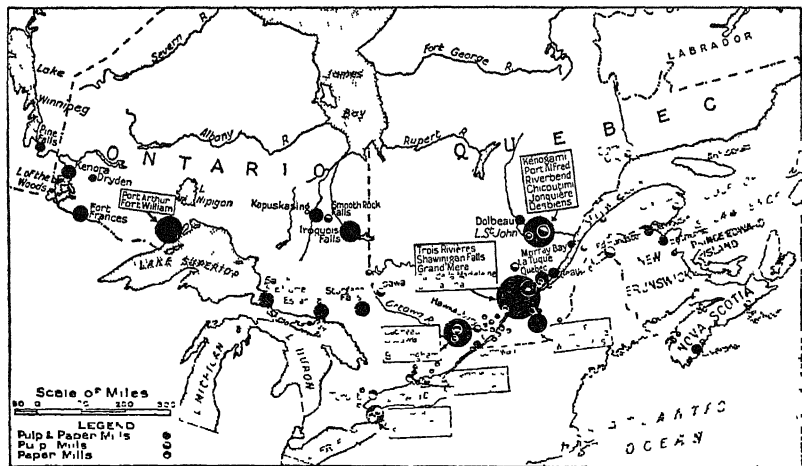


FIG. 9. The pulp and paper mills of Eastern Canada. The size of the circles is based on gross tonnage of mill capacity (National Development Bureau). (Courtesy of The Macmillan Company of Canada Limited.)

Alberta and especially in the Peace River district (Fig. 6). It was associated, also, with a considerable volume of engineering construction, though a much smaller proportion than for-

merly was in the field of railways. It was definitely stimulated further by the rapid development of the mining (Fig. 7) and pulp and paper industries in Northern Ontario and Northern Quebec (Figs. 8-9). The volume of this movement gives a much better indication of what is possible under any probable conditions in the future.

With the onset of the world depression at the end of 1929 immigration fell rapidly and has continued to fall until the present low levels were reached. This is but a further exemplification of a familiar phenomenon that immigration movements follow closely the movements of the business cycle. In all previous depressions immigration has been greatly reduced; that the reduction during the past seven years has been greater than any hitherto experienced is simply additional evidence that the depression through which we have been passing has been greater in extent and in intensity than any previously encountered by this country. In the main agricultural region it has been greatly intensified by persistent drought which, in some large areas, has not been broken in seven years.

Racial Diversity of Immigrants

A country that has absorbed large numbers of immigrants from other countries must be prepared to accept certain social and economic results which, in themselves, are problems. It must be prepared to accept a relatively high degree of racial diversity (Fig. 10). While Canada is a country whose population is predominantly of British and French origins, very large numbers of immigrants from other countries have been received into it. In 1931, over the country as a whole, 6.5 per cent of the gainfully employed males were of Central European origin, and about 6 per cent were of Eastern European origin; but in some parts of the country the percentages were much higher than this. In the Province of Saskatchewan, for example, those of Central European origin were 17 per cent of the total and those of Eastern European origin were 14 per cent. Stretching in a crescent across the three Prairie Provinces are many large agricultural settlements that retain strongly marked characteristics of the racial origins of their inhabitants. Certain cities show equally marked concentrations.

Racial diversity is by no means wholly a disadvantage. Much that is valuable as well as distinctive has been contributed to Canadian culture and progress by the people of foreign origin. One could readily list a score of specific contributions to the technique of developing Canadian resources beside less easily distinguished but no less important contributions to the ways of living. There are involved, however, very definite problems and costs which are greater for those whose customs and ways of living diverge sharply from those of the main part of the population.² When the rate of immigration is high, the difficulties of building up and operating the necessary social organization are great and the costs heavy.

Immigration of Unskilled Laborers

By far the greater proportion of immigrants entering Canada have been those who are roughly classified as unskilled workers. One of the results of this has been that, relative to the wages of skilled workers, those of unskilled workers have been lower than in most European countries. That is to say, though all money wages in Canada are higher than in European countries, the wages of unskilled workers in Canada are relatively less than those of skilled workers. Thus, whereas wages in Canada for various skilled trades in 1931 were more than twice the rates for similar trades in Great Britain, for unskilled workers they were barely twice.³ This is conspicuously true at the present time when, with six or seven years of training lost during the depression, the proportion of unskilled workers has increased substantially. The country will face a serious problem in encountering a shortage of skilled workers before it has been able to absorb its unemployed unskilled workers.

Since immigrant workers enter primarily in the unskilled category, they are likely to turn into the most casual and risky trades. (The census of 1931 reported that 71 per cent of the male wage earners without jobs were unskilled or semiskilled.) The risk of the recent immigrant from unemployment is sub-

² See C. A. Dawson: "Group Settlement, Ethnic Communities in Western Canada," *Canadian Frontiers of Settlement*, Vol. VII, Toronto, 1936.

³ *International Labour Review*, Vol. 23, 1931, pp. 729 ff.

stantially greater than that of native workers, and non-Anglo-Saxon immigrants unfamiliar with the language and Canadian customs are in substantially greater danger of unemployment. This is conspicuously true of those immigrants who entered the country in the years immediately preceding the depression. Table II makes very clear that immigrants admitted during prosperous times may occasion very heavy social and financial costs during ensuing depressions.

TABLE II

PERCENTAGE OF MALE WAGE EARNERS LOSING TIME THROUGH UNEMPLOYMENT, FOR TWELVE MONTHS PRIOR TO JUNE 1, 1931⁴

<i>All Wage Earners</i>	<i>44 per cent</i>	<i>Time of Immigration</i>			<i>Before 1911</i>
		<i>1926-29</i>	<i>1921-25</i>	<i>1911-20</i>	
Immigrant Wage Earners . . .		56	48	44	43
Central European		66	59	52	51
Eastern European		71	66	64	60

Influence of Immigration on Population Structure

A further problem, which is perhaps not directly related to immigration more than to a rising birth rate, is that the structure of population in a country that has recently received large numbers of immigrants is characterized by the high proportion of those in the lower age groups. Most immigrants enter the country shortly after having attained maturity, with the result that in the succeeding years the proportion of children in the population is greatly increased. While in many ways this is a desirable feature, in certain parts of the country it has placed a heavy cost on the community which insists on providing certain standards of education. In western Canada, for example, it is quite probable that there have been provided, to take care of the children of an immigrant population, educational and other facilities which will be in excess of requirements as the population structure assumes a more normal shape.

Agricultural Possibilities and Population Capacity

From the crude figures of Canada's size and population erroneous conclusions are almost certain to be drawn. When

⁴ *Census of Canada, 1931, Vol. 6, Tables 28 and 31.*

the density of population in Canada is stated as less than 3 to the square mile while that of Belgium is reckoned as 104, of the United Kingdom 70, of Germany 54, and of Italy 55, a wholly mistaken idea of the areas available for settlement is conveyed. Even greater errors arise in the popular mind from casual inspection of maps of Canada drawn on Mercator's projection. It is, of course, elementary geographical knowledge that enormous areas of northern Canada are all but completely uninhabitable and that further great areas that have definite productive possibilities can only be inhabited by populations of low density. Densities of population that areas will support are, of course, definitely related to the type of industry that can be established there. Over very large parts of Canada the only types of industry that can be profitably developed are those calling for a scanty, thinly scattered population. Any attempt to create by directed settlement populations of greater density would entail the abandonment of the most profitable industries, which are those depending on export markets, and would necessarily curtail greatly the imports of Canada from other countries; thus what other countries might seem to gain by increased immigration would be much more than lost by curtailment of trade. Beyond these crude errors, however, there are more specific estimates that are almost equally erroneous. Professor Stephen Leacock, for example, assumed responsibility for the fantastic estimate that the resources of Canada would support a population of 250 millions.⁵ There is no need to discuss the fallacious reasoning that led to so absurd an estimate. Even official estimates, however, convey quite mistaken impressions. The Canadian government reports yearly an estimated total of 351 million acres of potential agricultural land, of which approximately 200 million are said to be available for agricultural occupation.⁶ Any detailed examination of areas will show that this estimate is a gross exaggeration. A careful survey in 1931 of the agricultural possibilities of the three Prairie

⁵ Stephen Leacock: *Economic Prosperity in the British Empire*, Toronto, 1930, p. 50.

⁶ This estimate includes not only arable land but also grazing lands and wood lots.

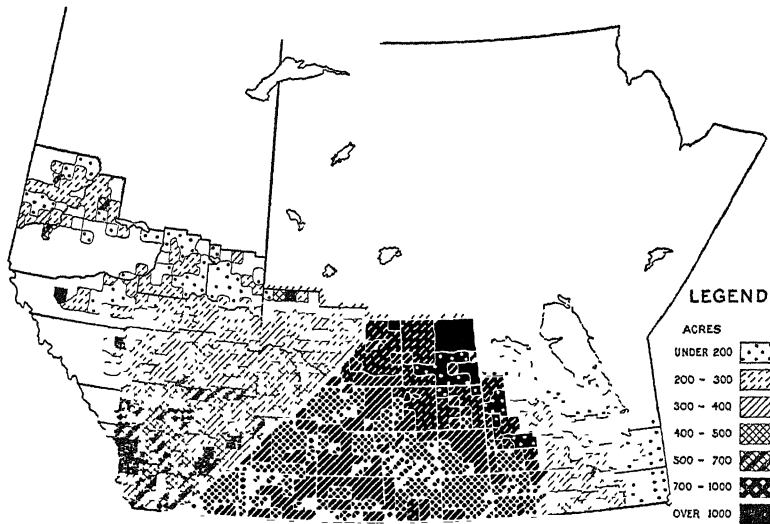
Provinces of Manitoba, Saskatchewan, and Alberta led the writer to the conclusion that there remained in those provinces at that time about 20 million acres of land available for agricultural occupation. This figure might have been increased by from 60 to 100 per cent according to the amount of rough nonarable land which it was estimated might be used in conjunction with arable land, but the government estimate at that period was that there were available 105 million acres, a figure shown by careful survey to be a gross overestimate. Even of the land that remained for settlement in these provinces the great bulk was distinctly inferior to that already settled.⁷

It is, of course, impossible to arrive at any definite estimate for the whole country that will have much meaning; every estimate must be based on certain specific assumptions. Agriculture is possible in certain areas if other industries provide profitable local markets; but, if agriculture in these areas has to reach outside markets directly and not through the medium of other industries, it cannot survive. Further, the slow adaptation of agricultural technique will make areas now not capable of development, possibilities in the future. The only safe course to follow is to have continually revised estimates of available lands that, in the then state of the markets and technical developments, are capable of development in the immediate future.

As pointed out earlier, immigration has been in the past associated in the main with agricultural development. In the postwar period, however, the awkward condition has arisen that, broadly speaking, over the settled agricultural areas the size of farms has been increasing and densities of rural population have been correspondingly decreasing (Figs. 11-12).⁸ There have, of course, been exceptions in the areas close to large metropolitan centers; but, generally speaking, changes in agricultural technique that have made the larger farm more profitable and have changed the profitable proportions between labor and land, have reduced substantially the degree to which agricultural expansion can induce increased immigration.

⁷ W. A. Mackintosh: "Prairie Settlement, The Geographical Setting," Canadian Frontiers of Settlement, Vol. I, Toronto, 1934, pp. 232-234.

⁸ *Ibid.*, p. 104.



FIGS. 11-12. Mean size of farms in 1921 (above) and 1926 (below) (compiled from the Census of Canada, 1921, and from the Census of Manitoba, Saskatchewan, and Alberta, 1926). The territorial unit is the municipality. (Courtesy of The Macmillan Company of Canada Limited.)

Up to the present there has been little evidence of that thickening of agricultural settlement which must be the accompaniment of any major increase in our agricultural population.

Areas of Possible Settlement within the Prairie Provinces

There are two great classes of areas in Canada offering possibilities for agricultural settlement: There are the areas that lie on the fringe of established settlement in the Prairie Provinces. These, however, lie not in grassland districts but in wooded areas (Figs. 13-14). With insignificant exceptions the day of rapid grassland settlement is completely finished. Much of the land in these districts is capable of agricultural development. The development necessarily will be slower than that in past decades, and greater risks will be attached to it both for the settler and for the governments concerned. The soils that are available will require more careful and more expert handling, while the variability of climate, particularly of the occurrence of frost, will create difficult problems in the selection and growing of crops. The cost and slowness of developing such land can only be borne if part of the cost is assumed by the government, or if, alternatively, supplementary employment is offered by other industries in the areas such as the forest and mining industries. Furthermore, it is generally true that where satisfactory land exists in such regions it is rarely continuous for long distances. It occurs in the main in comparatively small patches; and, in consequence, the density of population over the whole area will necessarily be low. From the point of view of Canadian governments this is a vital consideration. It means that these communities will have difficulty in supporting the overhead costs of rail and road transportation and of schools and other social institutions necessary for an adequate standard of life. Canadian governments have, therefore, become within the last few years much more attentive to the problems associated with settlement than they were in the days when there were large areas of vacant prairie lands capable of being exploited by a highly unskilled and heterogeneous farming population and capable of supporting relatively high densities of agricultural population.

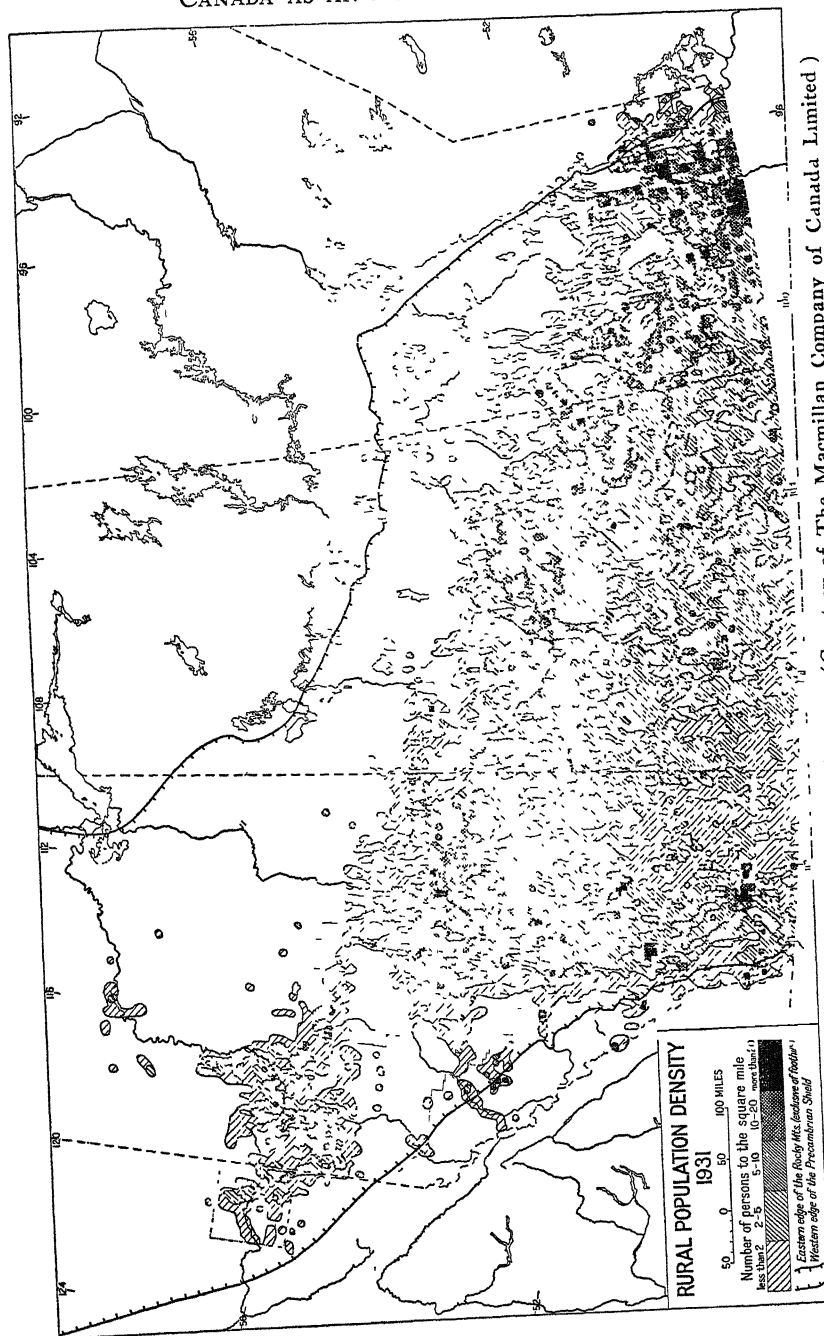


FIG. 13. Map showing rural population density in 1931. (Courtesy of The Macmillan Company of Canada Limited)

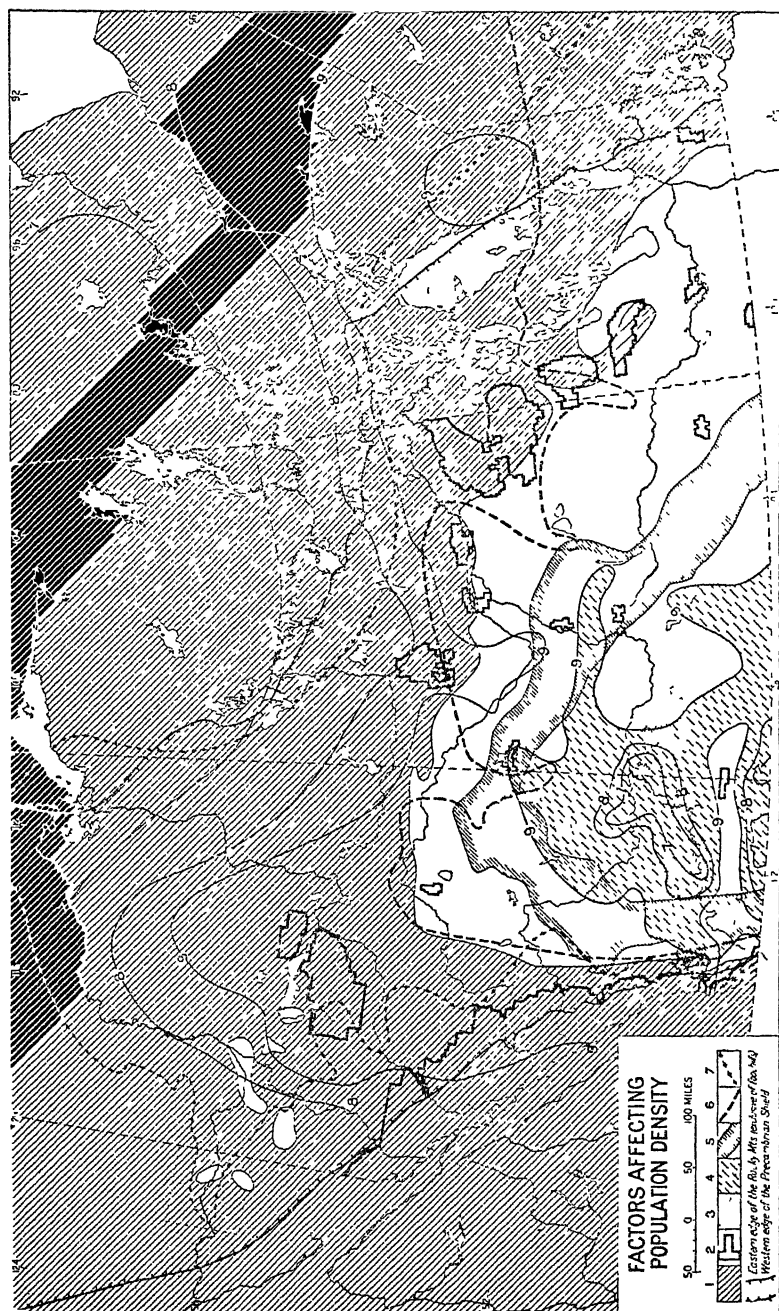


FIG. 14. Factors affecting population density. Key to numerals: 1, forest; 2, forest and other reserves; 3, sand dunes; 4, southern area of less than 9-inch summer rainfall; 5, boundaries of dark brown soil belt; 6, line north and west of which the growing season is less than 130 days; 7, northern limit of wheat growing, after Unstead. (Courtesy of The Macmillan Company of Canada Limited.)

Areas of Possible Settlement within the Canadian Shield

The other great class of areas available for settlement are those in the mining and forest regions (Fig. 15), lying chiefly within the Canadian shield as it extends through Quebec, Ontario (Fig. 16), Manitoba, Saskatchewan, and the Northwest Territories, and some similar areas in the provinces of New Brunswick and British Columbia. Here, agricultural settle-

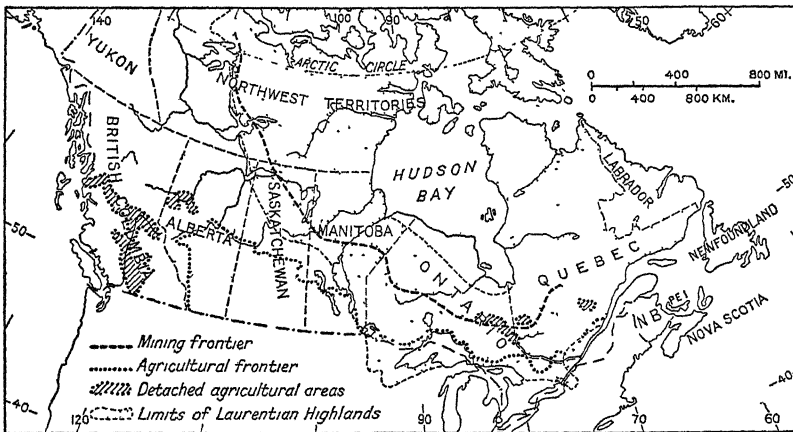


FIG. 15. Map of Canada showing mining and agricultural frontiers, detached agricultural areas, and limits of the Laurentian Highlands. For limits of forest see Figure 14.

ment is definitely subordinate to the development of the chief industries of the regions. The soils are second and third rate in quality and uneven in occurrence, and climatic conditions are difficult.⁹ For the most part agriculture on anything but a mere subsistence basis can survive in these areas only in so far as local markets and opportunities for offseason employment are provided by the mining and forest industries.

Settlers' Dependence upon Part-Time Employment

Anyone offering an answer to the question, what population can a particular area support, must state the standard of living that is deemed satisfactory. There are in Canada very large

⁹ The physical conditions affecting the spread of settlement in the Prairie Provinces as well as in the forest areas of eastern Canada are well summarized by Helge Nelson: *The Interior Colonization of Canada at the Present Day, and Its Natural Conditions*, *Geografiska Annaler*, Vol. 5, 1923, pp. 244-308.

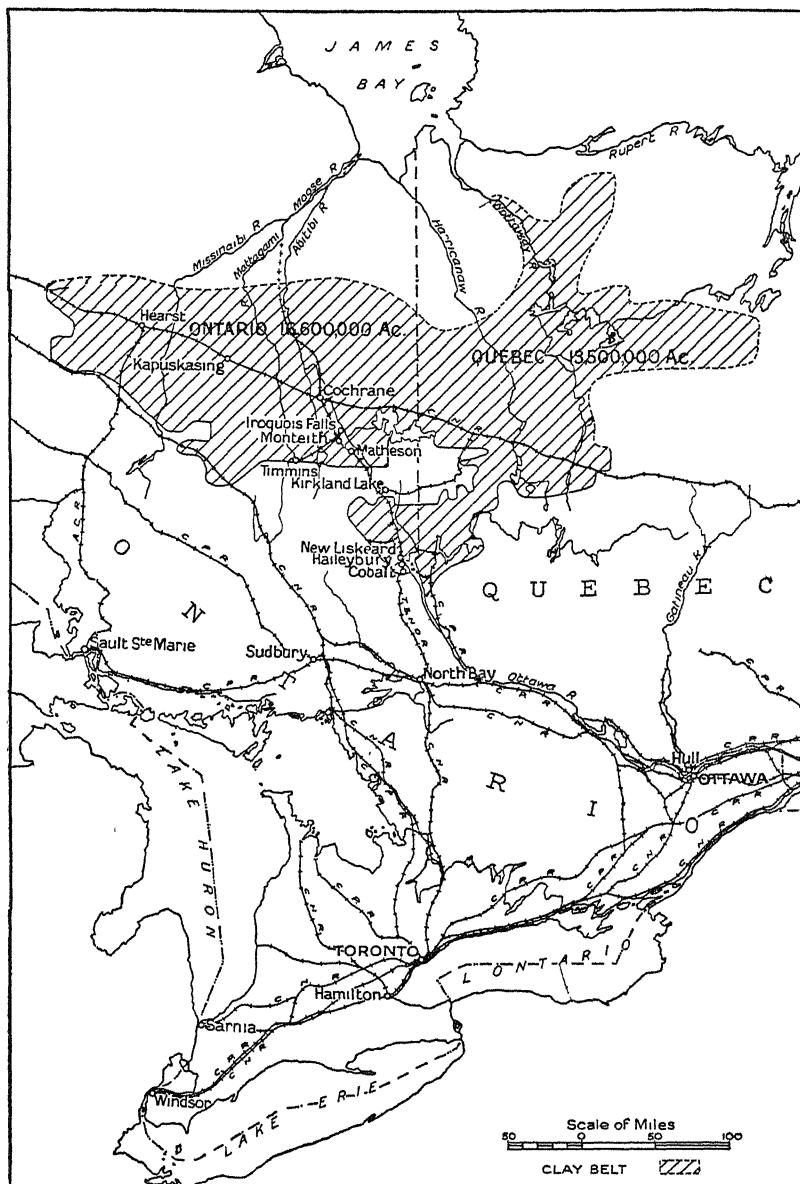


FIG. 16. The Clay Belt of Ontario and Quebec (National Development Bureau), which offers attractions to settlers because of its soil conditions. (Courtesy of The Macmillan Company of Canada Limited.)

areas of inferior-grade agricultural lands, probably capable of yielding a meager subsistence to industrious and patient settlers. More than this is dependent on the provision by export mining and forest industries of near-by markets and part-time employment. If these major industries are themselves subject to sharp cyclical fluctuations the difficulties of permanent settlement are greatly increased. Thus, in recent depression years, of the agricultural population that required and received public relief, almost all, aside from the areas of persistent drought in the prairie region, were in the recently settled districts of Northern Ontario and Quebec. In many cases, poor selection of land and inadequate supervision of development have been major factors in promoting this, but the chief cause has been the failure of supplementary income and employment previously supplied by the woods operations of the pulp and paper industry. There are very few agricultural parts of Canada settled in the past century where settlement has been achieved without supplementary employment for the new settlers. The speed of settlement is indeed dependent on the availability and steadiness of such supplementary employment.

In the pioneer work of these areas people of foreign origin have played a conspicuous part. In the pioneer districts of Northern Ontario, out of a population of 345,000 in 1931, 100,000 were of other than British or French origin. Finnish, Italian, Polish, German, and Scandinavian settlers made up the larger groups.¹⁰

Speed of Settlement Must Be Controlled

It would be folly to induce or even permit a very large influx of immigrants into these districts. Under conditions of rapid settlement heavy costs would accrue to Canadian governments, and immigrants from Europe would better their standards of living but little. The interests of the native population and the immigrants are the same: that settlement should be gradual, in order that the difficult problems of landuse may be solved, establishment made sure, and an improved standard of living achieved.

¹⁰ A. R. M. Lower: "Settlement and the Forest Frontier of Eastern Canada," Canadian Frontiers of Settlement, Vol. IX, p. 161.

Possibilities for Immigrant Labor

The mining and forest industries themselves provide employment for a considerable population, and a good deal of immigrant population flows toward them. The specific problem associated with them, however, is their extreme variability. Mining camps open and close and, particularly in the rapidly growing base-metal mining industry, the conditions of world markets are subject to extreme fluctuation. Here there is room for the employment of considerable amounts of immigrant labor, but such labor must be absorbed gradually and thoroughly trained, else it is in danger of becoming casual or even migrant labor.

In the field of industrial employment it may be expected that there will be continuous expansion. The history of economically immature countries is that as their primary and export industries develop, local secondary industries arise to compete with foreign producers for the attractive local market. Even aside from any degree of tariff protection that may be given these industries—and it is at present substantial—the long-run trend will clearly be upward. As mentioned before, however, the awkward problem confronting the enthusiast for immigration is that the ranks of the unskilled labor, into which most immigrants come, are for the time being more than filled; and, unless the process of training workers so that they may enter the ranks of the skilled or semiskilled is speeded up, there is danger of a serious problem of oversupply to these unskilled workers.

Immigration Policy Until 1930

Canadian immigration policy before the war was aggressive and positive. The desirability of the country for settlement was widely and continuously advertised in the United States and Europe. Steamship and railway companies vied with each other in offering cheap transportation and in some periods in earning government bonuses for bringing in settlers. After the war different conditions called forth different policies. There had been much questioning of the desirability of induced and

assisted immigration. The occupation of the whole of the open prairie made the problems of settlement more difficult and called for more assistance on the part of the government or more capital on the part of the immigrant. On the other hand, hopes of a new era in many countries and more generous provision of social assistance reduced some of the incentives to immigration.

Until 1930 assistance was given jointly by the British and Canadian governments to agricultural farm workers and domestic servants from Great Britain, and under the so-called 3000-family scheme the British government advanced money to equip families for farm settlement. No government assistance was given to immigrants from the continent of Europe; and, in general, immigrants who were assisted by their own governments were discouraged. Industrial workers were excluded, but agricultural and domestic workers were accepted.

Greater encouragement was given to immigrants from northern than from southern Europe, and Canadian medical and civil officers were stationed at Paris, Antwerp, Rotterdam, Hamburg, Danzig, and Riga. The active encouragement of immigration was left mainly to the two great railway systems both of which were interested in the increased traffic that increased agricultural population would bring, and both were also owners of agricultural lands.¹¹

In 1930 immigration of all except dependents of heads of families already established in Canada was suspended and up to the present has not been revived. Opposition to immigration has, in general, however, been based wholly on the degree of industrial and agricultural depression. Aside from the interests of specific groups, it has been generally appreciated that in a period of contracting employment and occupational opportunities the task of adjustment confronting the immigrant is too great both for him and for the community to which he comes. Adjustments that are easily accomplished in periods of expansion are difficult or impossible in the face of contraction.

¹¹Robert England: *The Colonization of Western Canada, A Study of Contemporary Land Settlement, 1896-1934*, London, 1936, p. 99.

Revival of Interest in Immigration: Reasons

Within the past few months there has been a heightened interest in immigration, and demands have been made in some quarters that the bars be let down and in others that an aggressive policy of assisted immigration be launched. With the great improvement in agricultural conditions everywhere except in the drought area of the West, it is natural that the railway companies should favor a renewal of immigration. It should be borne in mind that, though the railways have a distinct self-interest to serve, it is not a temporary interest. The inward traffic of immigration is much less important to them than the new freight traffic created by successful settlers, estimated to be worth about \$400 per year per settler.¹² The Canadian Pacific Railway is also a large landowner and is interested in the sale of its lands to settlers who can establish themselves and pay for their land.

More generally, people are impressed with the argument that Canada's per capita debt and her railway deficits per capita can be reduced if there are more heads by which to divide it. In other words, our governmental structure and our railway structure (with only 240 inhabitants for each mile of line) are capable of caring for the needs of a much larger population than the 11,000,000 people who now inhabit this country. It is sometimes overlooked that the simple arithmetic of this contention is in itself not very significant. Only if the new inhabitants maintain the previous per capita national income does their presence contribute to the solution of these problems.

Added to this, and beyond the unreflecting recollection that in the past fifty years active immigration has been associated with national prosperity, there has been a growing recognition that the possession of abundant resources carries with it a degree of world responsibility. The Ottawa Agreements of 1932 marked a new era in trade relations within the British Commonwealth. Not since 1849 had the system of Imperial preferences been complete. In general, the Agreements of 1932 were arranged by increasing the barriers against trade

¹² *Ibid.*, p. 114.

with countries outside the Empire rather than by giving greater freedom of trade within. Though the trend has been definitely set in the other direction by the Canada-United Kingdom Agreement of 1937, attention has been directed to the relationship between trade and immigration. If the economics of the statement are not too closely scrutinized, a country may logically say to others: We do not wish to encourage trade with you because we desire to build up our own secondary industries, but we will admit those who wish to migrate. Alternatively it may say: Because of the problems involved and the rapid growth of our own population we do not wish to admit your migrating citizens, but we will trade with you and thus make possible the maintenance of greater densities of population. But only on grounds of narrowest nationalism is it possible to say: We will neither admit your surplus population nor buy your products which might support your population at home.

While there is no general demand for an aggressive policy of assisted immigration there is clearly observable a growing opinion that immigration restrictions, except those of a selective character, should soon be removed. In the Province of Saskatchewan, definite approval has been given to the so-called Hornby Plan by which British settlers, assisted by the British government and British municipalities, should be settled on supervised farms in that province. The insistence on the British origin of settlers arises because the proportion of settlers of foreign origin is higher in Saskatchewan than in any other province.

Current Misconceptions Concerning Migration

In taking an international view of Canada as an area for settlement there are certain misconceptions which must be faced. Current discussion of the problems of countries of high population density opposite countries of low population density appear to rest on the assumption that it is easy through migration to reduce population densities. There is little historical foundation for such a belief. It has been true of some small countries, such as Scotland and Ireland, and more frequently true of districts within a country; but, in the main,

densities of countries with unequal birth rates are rarely equalized by migration.

Still less is it possible by migration to equalize per capita incomes. Too many factors contribute to unequal per capita incomes to permit of equalization even by prodigious migrations.

The great migrations of the nineteenth and early twentieth centuries—to the United States and Australia, to Siberia, South America, Canada, and Manchuria—contributed little to the reduction of population densities of the countries from which the migrating peoples came. The chief contribution made to human welfare by these migrations was the greatly increased mobility, occupational as well as geographic, in populations subject to great readjustments necessitated by new and unprecedented rates of industrial change. Thinking will be clearer if it is kept in mind that this mobility, a capacity of individuals to shift for themselves, and not redistribution of the world's population, is the result of immigration and settlement.

The second misconception, which is common, is that settlement is an easy and rapid process. In fact, for the individual it represents a revolutionary change in ways of living and demands an adjustment by the settler and his family that they will find it possible to make only over a period of years. For the community as a whole the problems created by new settlements vary directly with the rapidity of the movements; and, further, the number of mistakes made and the number of retreats that have to be undertaken are also to a considerable extent affected by the speed of settlement. Large and rapid movements of settlers into new areas are likely to bring heavy costs both to the settlers and to the country as a whole and may bring little satisfaction to the countries from which settlers come.

Conclusion: Future of Canadian Settlement

Looking forward to the future of Canadian settlement, we can expect that given favorable world conditions there will be a renewal of immigration and of land settlement. That renewal will depend particularly on the continued improvement in

world trade and the participation of Canada in that improvement. Untoward international events which may stop the modest revival that has taken place in world trade would undoubtedly damage these prospects. There is no likelihood that the rate of land settlement in Canada will approach the pre-war figures; that is neither probable nor desirable. There will be a gradual pushing back of the northern frontiers of agriculture and an increasing number of successful settlers in the wooded areas stretching across the land north of the present settlements. That movement will, however, need to be much more carefully watched than previous settlement developments. It will need to be directed and controlled to a degree not hitherto common. Only by careful survey of the resources of such districts can reasonable choice of locations be made. It is not merely a matter of determining whether land is capable of yielding a livelihood; it is necessary, also, to see that there are sufficiently compact areas of land capable of sustaining not merely the individual farm families but the community overhead costs for transportation, education, and civil government. Direction will, indeed, need to be carried further. Experience in Northern Ontario and Quebec makes very clear that direction is needed in the selection of crops and in the preparation of products for the market; else, even locally, superior graded products from older settlements will monopolize the market to the exclusion of inferior local products.

In Canada the control of natural resources rests constitutionally with the individual provinces while the control of immigration is a responsibility of the Dominion. There is need, therefore, for coördination between the two units of government. It is important that provinces should develop plans of assisted land settlement, which should be open to satisfactory applicants whether native or immigrant, and that the immigration policy of the Dominion should be adjusted to these conditions.

It is probable in the future as in the past that there will be some preference given to the Anglo-Saxon settler whether from the United States or from Great Britain. The preference, however, is likely to be given in the form of additional assistance rather than by the exclusion of other racial stocks. It is

necessary for a proper immigration policy that a basis of selection should be determined. But it is not desirable that race should form the basis of such selection. While in certain sections of the country, where the populations of foreign origin are large, there is some movement toward attempts to increase the Anglo-Saxon proportion, in general there is no widespread demand for exclusion of particular races. There is likely to be more insistence, particularly from the wage-earning groups, that preference be given to agriculturists rather than to those who will enter the wage-earning trades.

It is desirable that the renewed movement of settlement and immigration should be moderate. It can be expected to attain the postwar average of about a hundred thousand a year. To a considerable degree the movement should be planned, but not so as to exclude individual initiative. History has shown that the most natural and in many ways the most successful immigration has been that of individuals who obtained their knowledge of the country through friends and relatives and who have come as immigrants assured of help and information from those of their own country who have come earlier. Any system of planned immigration which destroys this natural movement is likely to fail. Further, it can be repeated that actual settlement requires careful direction and aftercare.

The volume of immigration and settlement, as has already been stated, will depend to a marked degree on the extent of industrial and agricultural recovery. In particular it will depend on the recovery in world trade and the extension of our great export industries which are based primarily on the exploitation of natural resources. Directly or indirectly most of the settlement will depend on the prosperity of these export trades. In western Canada agriculture is itself dominantly an export industry. In the pioneer areas of other parts agriculture is definitely subordinate to the great export mining and forestry industries, particularly the pulp and paper industry. The rise and fall of land settlement may, therefore, be expected to follow closely the course of these industries.

Public opinion in Canada is becoming favorable to renewed immigration and settlement. There is no disposition to adopt severely exclusive policies. The exclusion since 1930 has been

wholly dictated by conditions of depression, and indeed there has been little demand for entry on the part of immigrants. It seems fairly clear that Canada is willing and feels it in her own interest to contribute to a desirable world mobility of population and freedom of opportunity. Because she has suffered much from the depressions following on great settlement and construction booms she is likely to moderate rather than accelerate them as in the past. But there is every disposition to welcome settlers to share in the development of the country's natural resources at as rapid a rate as seems desirable both for the country and for them.

POPULATION FACTORS IN SOVIET SIBERIA

By Bruce Hopper

Harvard University

FOREWORD

IN ANY study of world-population problems Siberia commands interest as the one example of socialism in the wilderness, where the civilization is new, and where the application of science and planning in a vast territory of untapped resources indicates a future capacity to absorb millions of additional population. The capacity is unquestioned. Much depends on the course of the planning in years to come. At present the student is baffled by the fragmentary or vaguely grandiose nature of the information available. Several months' study of such data, which cannot be intelligently integrated, creates in the mind an almost dramatic certainty of a populous future Siberia. But conclusions as to specific population capacity remain elusive.

One explanation of the lack of satisfactory materials is that Siberia assumed fundamental importance in Bolshevik planning at so recent a date (1930). The published geological reports do not define Siberia's share of the total mineral sources of the Union. The area is only partially explored. Much of it remains to be surveyed and is being mapped and photographed from airplanes. Of even more importance to a population study would be the reports of the All-Union Colonization Committee on the regions selected for colonization; these are not yet available in America. Further, the ten-year census, taken in January, 1937, will probably upset population calculations based on previous estimates. A survey of twenty years of Soviet Siberia may be among the publications issued in connection with the celebration of the 20th

anniversary of the Revolution. That, at least, should clear up some of the mysteries of regional planning, which evidently requires such frequent shifts in administrative boundaries that it is impossible to trace the continuity of development in either the separate parts or the whole of Siberia. And, in general, it is difficult to isolate Siberia from the Soviet Union as a whole, except in a single set of figures, such as the 1936 Plan.

The scope of this paper, therefore, is limited to a presentation of the factors that affect but do not define the population capacity of future Siberia. As colonization is subordinate to the general objectives of planning, it is necessary to indicate some of the peculiarities of Bolshevism that seem to insure the development of Siberia to its utmost capacity.

I. BOLSHEVISM AND POPULATION

Regardless of its territorial setting and its powers of evolution, present-day Bolshevism is a system of channelized enthusiasm for building. It is geared to population growth and economic expansion. Whether or not such a system would retain its purity, in event of economic and population stability, is beyond the range of calculation. Suffice it to say that Bolshevism is operating in the largest continuous land expanse of the earth, which area contains within its matrix the forces of expansion and the necessary outlying regions into which expansion may take place.

Increased Employment in Areas Already Settled

The transformation of European Russia in the last eight years is the outstanding economic fact of postwar history. The elements producing the change are too numerous to mention here, but they include socialized industrialism (with the emphasis on heavy industry), collectivized agriculture (with better land utilization through mechanization, artificial fertilizers, etc.), and the planned construction of new factories and plants on a scale never before undertaken anywhere. The problem of labor power appeared after the launching of the First Five Year Plan. Previous estimates of surplus popula-

tion in the villages ranged from six to seven millions. Unemployment was upward of one million. But by 1932 there was an acute labor shortage, and laws had to be passed restricting the mobility of labor. It has been characteristic of the Soviet planning system that the building of plant proceeds at a faster tempo than the training of technicians and skilled workmen. In any case, the demand for labor power is likely to continue for an indefinite period. The Bolsheviks boast that unemployment cannot recur in USSR.

Increase of Population

The Bolshevik tempo of increasing the means of employment is matched by the amazing fertility of the Slavs. The total population of the Soviet Union is estimated at 170 to 173 millions. The increase averages 3 millions a year. The birth rate is not far from three times that of Western Europeans, while the death rate is rapidly declining. The excess of births over deaths amounts to 2 per cent.

According to Kuczynski's computation, the present reproductive rate is 1.7. The population has doubled itself in the last 65 years and is expected to double itself again in the next 40 years, a generation and a half. Dr. Dublin also emphasizes the vigor of the people.¹ They show no evidence of moral or physical weariness. All circumstances seem to be conducive to maintenance of fertility and rapid increase of population. In fact, the Bolshevik leaders are attempting to whip up the population increase even more, to add "new hundreds of millions." The prospect of some 340 million Soviet citizens by the year 1975 has a military significance of serious concern to other countries. And yet Dr. Dublin also observes that "the Soviet Union is the great enigma in the population situation, as it is in other fields of social organization."

"Planned" Socialist Citizens

Speculation as to Siberia's future population suggests a query regarding the human type patterned by decades of living under Bolshevism. The Bolshevik ideal is a nonacquisitive, property-less, self-regulating individual citizen, distin-

¹Louis I. Dublin: *The Population Problem and the World Depression, Foreign Policy Pamphlet No. 1*, New York, 1936.

SOCIAL STRUCTURE OF POPULATION OF USSR

	1928	1934 (January 1)
1. Proletariat (workers and employees).	26,343,000	47,118,000
Including:		
A. Industrial.	24,124,000	41,751,000
B. Agricultural.	2,219,000	5,367,000
2. Collective farmers and coöperative		
Artisans	4,406,000	77,037,000
3. Individualist farmers.	111,131,000	37,902,000
4. Bourgeoisie	6,801,000	174,000
Including kulaks.	5,618,000	149,000
5. Others (students, army, pensioners)	3,671,000	5,769,000
Total.	152,352,000	168,000,000

POPULATION EMPLOYED BY STATE ECONOMY
(thus excluding collective farms and coöperatives)

(according to branches)

	1928	1935
All state economy.	11,599,000	24,769,900
Including:		
Heavy industry.	3,096,000	7,065,500
Building.	723,000	2,203,900
Transport.	1,270,000	2,921,800
Agriculture.	1,676,000	2,973,900
Inc. state farms and tractor stations.	345,400	2,837,300
Timber industry	331,000	1,300,000
Communications.	95,000	334,400
Trade.	532,000	1,650,000
Social feeding.	55,000	484,800
Education.	789,000	1,725,400
Health.	399,000	808,600
State administration.	1,174,000	1,745,200
Credit.	96,000	151,900

The above two tables indicate the bases for the Bolshevik claim that socialism has arrived. The only group of importance outside the socialized sector is the individual peasants, numbering 37 millions. But they hold only 6 per cent of the sown area and account for 7 per cent of the agricultural production. The increase of employees of state economy from 11 to 24 million between 1928 and 1935 shows absorption of the surplus population on the land by industry.

guished by social character and talent. The central method for attaining that end may be described as purposeful change of human nature by behavior conditioning. It is believed by Soviet leaders that economic collectivism will so accustom individuals to nonacquisition (social ownership of the means of production), that the instinct itself will gradually disappear. The faculty of self-regulation is being encouraged by the new democratic constitution, which greatly increases the share of the large mass of citizens in the government, thus in the control of socialized property. Another means by which it is sought to shape the socialist type of citizen is to reward talent and merit with distinction and power, regardless of the social origin or former zeal of the recipient. If an *élite* is thus created, its criterion will be political usefulness plus efficiency. While the "planned" citizen thus envisaged may not be the prevailing type in future Siberia, the Soviet government does reserve the power of selecting suitable persons for the controlled industrial and agricultural migration. Siberia is still a frontier, calling for pioneer stock and leaders.

Eastward Expansion

It is a historical truism to observe that social revolutions unleash energies that have been bottled within a suppressed people for centuries. Often these energies overflow the national frontiers, making for military conquest. The direction of Bolshevik expansion, from the matrix of energy in European Russia, has been predetermined by geography. It must be eastward, into backward, noncapitalistic Asia. Despite the Marxian dictum that social revolution can succeed only through the leadership of a class-conscious proletariat (e.g. in advanced capitalist countries), Bolshevik aid to revolution has been most effective amongst the nonproletarian peoples of the East.

In the realm of ideas the Russian Revolution is to the East what the French Revolution was to the West; industrially it is to Asia what Europe was to America after the Renaissance. The East, historically, failed to keep abreast of the West in science, which produced the industrial revolution. And by operation of the law of uneven development of na-

tions, the peoples of Asia lapsed into colonial or semicolonial subjection to Western imperialism. The Bolsheviks consider it their mission to emancipate Asiatic peoples from imperialism, and correct their economic backwardness by native ownership of their resources, modernization, etc. They regard nearly all Eastern people as under their special tutelage.

The missionary effort beyond the Asiatic frontiers is limited, at present, to the maintenance of lenient economic relations and friendly political influence. The surplus energy, created by the matrix in European Russia, flows into the Soviet regions of Central Asia, Kazakhstan, and Siberia, the sources of minerals and other wealth. Out there the revolutionary *élan* is directed toward the conquest of nature on a grand scale—to such feats as reflowering the desert by irrigation and artificial weather control, extending the agricultural line north into the tundra, conquering the ice in the polar seas. Gigantic tasks are necessary to consume the energies of the Revolution. They are so necessary, in fact, that had the Bolsheviks not inherited a Siberia they would eventually have had to conquer one as a pendulum to their system.

Changing Role of Siberia

To the Tsarist government, Siberia was a penal colony which served as an inadequate outlet for overpopulation in European Russia. It produced raw materials for the industrial centers near the European frontier. The areas away from the railway zone and the main rivers remained, for the most part, unknown. Agriculture flourished, especially dairying, in the western section. There were but few industries; the existence of great stores of minerals was not suspected. Old Siberia thus had the aspect of a colony of Russian capitalism.

Even the Bolsheviks were not immediately aware of the possibilities of Siberia. Until 1928 they were occupied with the restoration of old plant. And the First Five Year Plan, which began the large-scale construction of new plant, relied originally on the coal of the Donets and the iron of the Ukraine.

It was the imperative need for a second fuel-metal base that in 1930 caused a shift in the axis of the First Five

Year Plan and began the eastward trend of industry with the building of the Ural-Kuznetsk Combine. Meanwhile, the reports from geological expeditions and other surveys indicated that the bulk of fuel, metals, water power, etc., was located east of the Urals. If further incentive were needed, it came when Japan conquered Manchuria in 1931-1932. The eastward movement was accordingly accelerated in the Second Five Year Plan, 1933-1938, which impetus carries on into the Third Five Year Plan not yet in operation. Although it is not likely that the European part of the Union will cease to be the matrix, the Siberian section from the Urals to Lake Baikal seems destined to be the strategic citadel of the Bolshevik planned civilization in Eurasia. This prediction lends particular interest to the Siberian scene, and to the basic population.

II. PHYSICAL DESCRIPTION OF SIBERIA

The boundaries of Siberia are difficult to define. In the prewar materials Siberia began at the Urals and included the northern part of the steppe country (now Kazakhstan). The Far East was often omitted from calculations. Soviet writers are equally vague at the term, sometimes including all of Asiatic Russia.

For the purpose of this population study Siberia will be taken to mean six regions defined in the revision of administrative areas in 1934-1935—Omsk District, West Siberian Region, Krasnoyarsk Region, East Siberian Region, Far Eastern Region, and Yakut ASSR. This omits one of the most favorable regions for further colonization, northern Kazakhstan. It also leaves out the sections immediately east of the Urals, which were formerly considered part of Siberia. There is some justification, however, for considering the Sverdlovsk and Chelyabinsk districts of the Urals as part of Siberia economically, as they form the western end of the Ural-Kuznetsk Combine. They are omitted, however, from the picture of future colonization. (See Fig. 1, page 96.)

The total area of the six regions mentioned above is 11,271,100 square kilometers, 53 per cent of the total surface

of the USSR. The population, as of January 1, 1933, was estimated at 14,394,500, 8.57 per cent of the total. Siberia may thus be described as the most "vacant" of all the large economic areas of the earth.

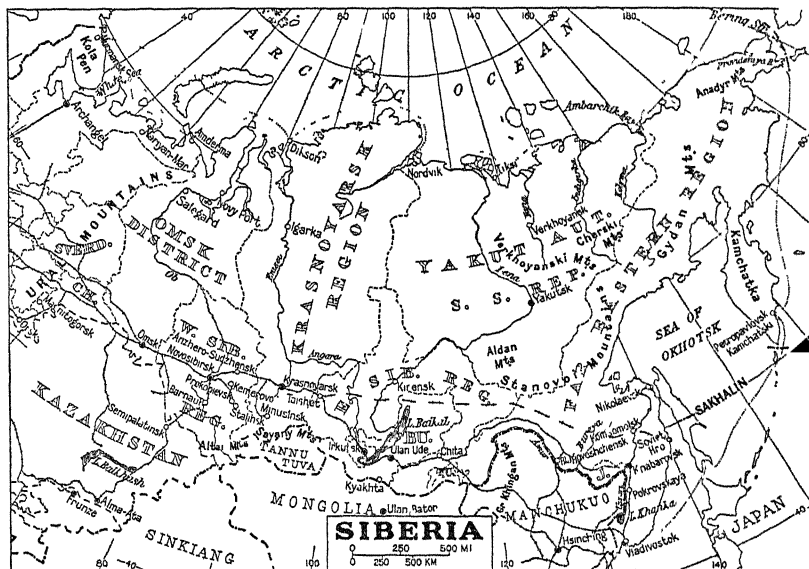


FIG. 1. Map of Siberia showing the six new regional subdivisions (according to the Bolshoi Atlas, 1936). Sverd. is an abbreviation for Sverdlovsk; Ch., Chelyabinsk; W. Sib. Reg., West Siberian Region; E. Sib. Reg., East Siberian Region; Bu., Buryat-Mongolian ASSR; J., Jewish Autonomous District of Birobidzhan.

Relief

From the point of view of relief there are two Siberias, divided by the Enisei River. The western part is an enormous low plain, stretching from the Altai to the Urals and the Arctic. Here lie large areas in temperate latitudes, within easy reach of Europe, suitable for agriculture. The eastern part is elevated land in more northern latitudes; an extension is the eastern plateau which reaches from the Pamirs and Himalayas to Bering Strait. The plateau is cut by two series of mountain ranges which run northward from the Sayany highlands and Lake Baikal to the Aldan Range, and from the Great Khingan along the Stanovoi Range to the stone arc formed by the Verkhoyanski, Gydan, and Anadyr Mountains in the far north-east. In 1926 Soviet explorers discovered within this stone arc

another range, some 10,000 feet high, which they named the Cherski Range.

The historical significance of this relief is that the western part has been developed much more rapidly than the eastern. The plateau has been a buffer land between the areas of Pacific and Arctic influence and has prevented easy communication. Much of the eastern part is yet to be explored. The recent Soviet geological surveys, however, indicate mineral riches, which should insure future large-scale development.

Siberia is characterized by four main river systems: the Ob, the Enisei, and the Lena, with Arctic drainage; and the Amur which flows to the Pacific. Because of the gentle slope from the southern highlands to the Arctic, the rivers flowing north are navigable almost throughout their length and the length of their numerous tributaries. Consequently, Siberia is pre-eminently a land of water traffic. Moreover, the tributaries rise so near each other that it is possible to cross Siberia east and west by waterways, with an occasional low portage. (The Russians advanced to the Pacific by internal waterways between 1582 and 1639.) The northward flow results in a characteristic high right bank suitable for settlement, and a low left bank liable to inundation. It is thought that railways will never replace waterways as the chief means of transport in Siberia. The Amur River has a separate story but also is an extremely useful waterway. The Arctic exits of the Ob, Enisei, and Lena have prevented development of large-scale foreign commerce. The Northern Sea Route, however, developed since 1932, holds considerable promise of development through conquest of the ice barriers. Since the operation of ships along the Arctic shore more rivers in hitherto unexplored areas have been opened to river traffic; e.g. the Yana, Indigirka, and Kolyma Rivers in the far northeast.

The seasonal character of river traffic, however, will necessitate railway development in the more settled areas of the north. The breakup of the ice on the rivers with a northward flow occurs earlier in the upper or southern stretches, causing spring floods. Flood control is one of the problems of Soviet development.

		Average Date of:	
		<i>Breakup of Ice</i>	<i>Freezing Over</i>
Irtysh at:			
Semipalatinsk	April 30	Nov. 26	
Omsk	May 14	Nov. 18	
Ob at:			
Barnaul	May 8	Nov. 23	
Salegard (mouth)	June 16	Nov. 9	
Enisei at:			
Minusinsk	May 11	Nov. 29	
Krasnoyarsk	May 12	Dec. 5	
Mouth	June 23	Oct. 30	
Lena at:			
Kirensk	May 24	Nov. 4	
Yakutsk	June 10	Nov. 12	
Mouth	July 8	Oct. 15	
Amur at:			
Blagoveshchensk	May 12	Nov. 25	
Nikolaevsk	June 1	Nov. 25	
Ussuri at:			
Pokrovskaya	May 13	Nov. 19	

Climate

Although Siberia has a variety of climates, the main characteristic is the continental extreme of cold winters and hot summers. However, because of the dryness and the prevalence of sunshine, the winters are invigorating and healthful. During the extreme cold the air is still. The temperature range is as much as 120° F. The winter isotherm bends sharply southward in Siberia, so that the 0°C. isotherm passes through Archangel on the White Sea and lowers to Krasnoyarsk and Chita in Siberia. More than three fourths of Siberia has a colder climate than Archangel. But the dryness of the air makes the cold bearable, at least south of 50° N. (The writer visited Siberia of the railway zone in winter and experienced no discomfort from cold.) On the other hand, the length of the winter is a serious disadvantage. In most of the area there are six months of frost. Precipitation is slight and occurs chiefly in summer. Contrary to popular belief, snowfall is not heavy in Siberia. In the Far North precipitation is less than eight inches a year, on the Amur 20 inches, and in Kamchatka 40 inches. Owing to the lack of

mountain barriers* Arctic air masses influence the climate southward almost to the Trans-Siberian Railway.

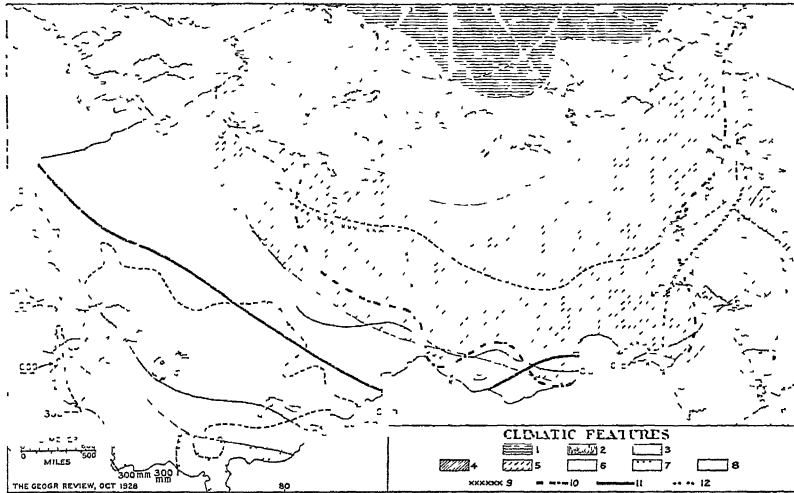


FIG. 2 Climatic features of Russia, compiled by B. and I. Semenov-Tian-Shansky 1, sea almost completely ice-covered; 2, sea with floating ice; 3, sea ice-free in summer; 4-8, duration of frost (4, 9 months; 5, 6-9 months; 6, 3-6 months; 7, 1-3 months; 8, less than 1 month); 9, limit of permanently frozen ground; 10, limit of cold winters (more than 20° C. of frost); 11, limit of hot summers (more than 20° C. of heat); 12, January "Pole of Cold" (-45° C). Mean annual isotherms 0° and 10° C. are shown and isohyets of 300 millimeters and 1000 millimeters. (Courtesy of *The Geographical Review*)

Zones

While low relief fails to give variety to the country, at least in the western part, there are several clearly marked zones determined by latitude. The tundra, 20 to 200 miles wide, stretches along the Arctic shore and is covered for nine months of the year by snow or ice. The vegetation of the marsh is chiefly grasses and herbaceous plants, reindeer moss, occasional dwarf trees, and abundance of flowers. In summer, although the surface thaws, the subsoil remains frozen. The most striking zone of Siberia is the taiga, virginal forest, 4600 miles long, and 600 to 1300 miles wide. The predominant trees are pine, fir, larch, and Siberian cedar. The ground is covered with moss. The taiga is the habitat of the fur-bearing animals, sables, gray squirrels, hares, foxes, wolves, bears, elk, and deer. The forest-steppe zone, next far-

ther south, shades into the famous black soil belt (which extends as an elongated triangle from the Ukraine to beyond Lake Baikal). Farther south are the steppe proper and the sand and oases of Central Asia.

In the matter of crop capacity of the soils of Siberia there seems to be considerable variance between the pronouncements of the Soviet agronomists and foreign soil experts. The

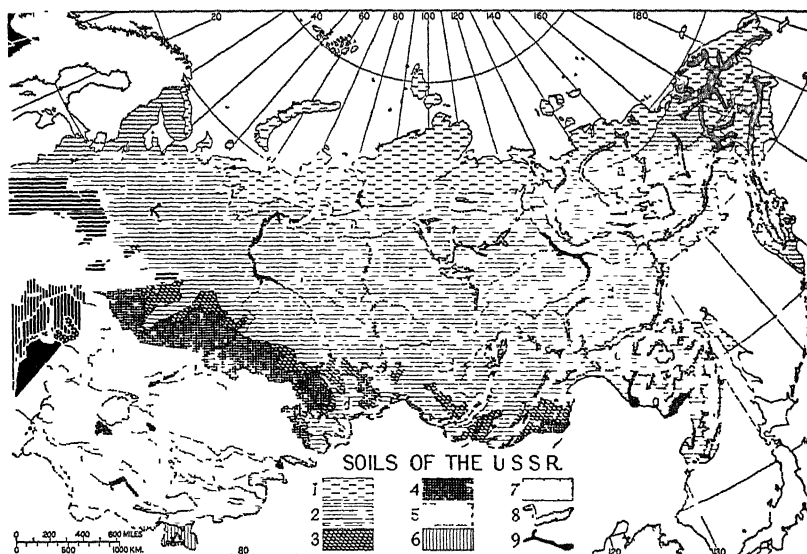


FIG. 3. Soils of the U.S.S.R. 1, tundra soils; 2, podzolized soils, *a* forest-tundra soils, *b* podzolized soils of the North European and West Siberian lowlands characterized by widespread development of bog (mostly peat-bog) soils, *c* lightly podzolized soils of the northern part of the forest belt (taiga), *d* lightly podzolized soils of the East Siberian plateau, *e* podzolized soils of the Far East and Kamchatka (Okhotsk Basin); 3, degraded and leached soils of the forest-steppe belt; 4, chernozem and chernozem-like soils; 5, chestnut-brown and brown soils; 6, gray soils (serozems); 7, sandy soils of the dry steppes and deserts; 8, mountain summit soils; 9, alluvial soils of river bottom lands. (From *Pioneer Settlement*, Amer. Geogr. Soc., New York.)

richest section is the black soil, covering about one million square kilometers in western Siberia. The greatest part of Siberia is *podzol* ("ash-colored underneath"), which is not so favorable to agriculture.

L. I. Prasolov makes the following observation:

Generally speaking, in all the forested zone and in the podzol zone there are few soils that cannot somehow be utilized for agriculture. The only ones that cannot be utilized are rocky areas and the deep

peat soil. All types of podzol soils, even the characteristic podzols and also the transitional peaty bog soils and especially the silty bog soils of the lowlands, can, through melioration and fertilizing, be reclaimed for cultivation. Because these soils are not directly utilizable, however, only an insignificant part of the northern regions is at present used for agriculture.²

It should be noted that the Soviet government has spent huge sums on experimentation and the study of soils. The reports of extraordinary yields in the area of permanently frozen subsoil, including the tundra, inspire the belief that Soviet science may disprove much of the dismal judgments on the crop capacity of northern Siberia. By the extensive use of phosphorites (apatite from the Kola Peninsula) and other fertilizers, and by drainage of the lowlands and other forms of reclamation, large areas of formerly waste land have already been made arable. Especially interesting are the results of crossing hardy nonbearing with bearing strains of berries from the temperate zone, to produce polar varieties. The data are insufficient to indicate the scope of reclamation in Siberia. "Polar agriculture" is still in its infancy as a science. The most that one can say is that Soviet scientists are highly confident that poverty of soil, rigorous climate, and even the problem of constant light in the growing season will be conquered and that northern Siberia will be self-contained in food supply.

III. THE SIBERIAN POPULATION

Colonization

Russian colonization of Siberia began with the Yermak expedition that captured the Tatar city of Sibir (whence the name) on the Irtysh River in 1582. The subsequent conquest of the entire area to the Pacific, within 50 years, was relatively without opposition.

The early immigrants were mostly Cossacks seeking adventure and furs. Following them came priests, monks, and finally the exiles. In 1622 there were but 23,000 Russians and

²L. I. Prasolov, "The Climate and Soils of Northern Eurasia as Conditions of Colonization" *Pioneer Settlement, Amer. Geogr. Soc. Special Publ. No. 14*, 1932, p. 253.

other immigrants in Siberia and 173,000 natives. In the eighteenth century minerals were discovered. The government started a stream of immigrants, including crown peasants (merely transplanted) and exiles of all sorts, criminals, politicals, war prisoners, to work in the mines.

But serfdom was an obstacle to spontaneous colonization. A decree of 1760 authorized proprietors to send serfs to Siberia—the less valuable, who made poor colonists. So little progress was made, however, that by 1796-1797 the Russians and other immigrants amounted to only 575,000 alongside 363,300 natives.

In the next 60 years the population trebled, but more by natural increase than by immigration. After the emancipation of the serfs in 1861 the flow to Siberia increased, under government planning. From 1858 to 1897 (opening of the Trans-Siberian Railway) the population of Siberia increased 85 per cent, about 63,400 a year. The greatest increase was from 1897 to 1915, averaging 223,400 a year. According to Ossinsky,³ Russian registered migrants settling in Asiatic Russia between 1801 and 1915 numbered 6,021,000, about 70 per cent going to Siberia. Of these, 1,312,000 were compulsory migrants. With the World War and Revolution the flow to Siberia declined. The figures, however, do not even estimate the number of unregistered peasants on the move.

The method of colonizing Siberia has varied. In 1906 a Department of Emigration was created in the Ministry of Agriculture. Its function was to survey regions for colonization, to render colonists agrarian, financial, and medical assistance. The settlers were also exempted from taxation for various lengths of time. During the period just before the World War the allotment to each colonist in land was 16.5 hectares, making a total of 21,733,800 hectares. The departure of the colonists freed 5,500,000 hectares in Central Russia and the Ukraine, thus increasing the average portion there for the remaining peasants to 1.9 hectares for each working peasant.

³ U. V. Obolensky—Ossinsky: "Emigration from and Immigration into Russia," *International Migrations*, New York, 1931, Vol. II, p. 556.

The main propulsion of colonization in Siberia was overpopulation on the land of European Russia. There was also a lack of balance between production and consumption. Despite the insufficient yield, owing to backward agricultural methods, the population increased by a "steady rhythm." On one side of the Urals there was overpopulation; on the other

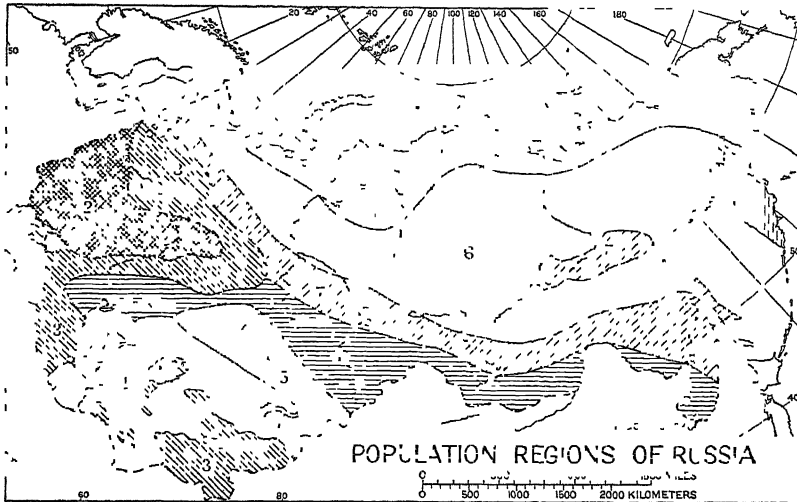


FIG. 4. Population regions of Russia. 1, areas not suited to agriculture (tundra and desert); 2, areas with rural overpopulation; 3, fully occupied areas with no excess of population; 4, relatively densely populated areas with possibilities for additional settlement; 5, sparsely populated areas; 6, part of the taiga belt unsuited to agriculture; 7, southern border of the taiga belt suited to agriculture. (From *The Pioneer Fringe*, by Isaiah Bowman, Amer. Geogr. Soc., New York.)

the average density was less than 2 persons to the square kilometer—thus the "call of emptiness."

In the first year of the Revolution 1917-1918, there was a temporary renewal of migration eastward, mostly of demobilized soldiers, workers whose factories had closed, and a scattering of dissatisfied peasants. In 1924 the Soviet government turned official attention to the problem of colonization of the east. A decree of the Council of Labor and Defense that year announced a policy of making displacement of population serve the national interests in developing natural resources. In March, 1925, a Soviet Committee of Emigration was established, and colonization became an item in

the state budget. The Soviet efforts were similar to those pursued under the Tsarist government—advance information to prospective colonists, assistance in leaving the old home and in settling, reduced railway fares, exemption from taxation and military service, credit for supplies, and agrarian and medical service in the new settlement. According to the figures published by the Committee of Emigration in 1928 it had by that time transplanted 251,000 persons; by 1932 the figure reached 700,000. But besides these registered colonists there was a spontaneous flow of colonists (still possible then) for which there are no statistics. Free colonization represented 80 per cent of the total at the beginning of Soviet efforts. By 1928 it had dropped to 33 per cent. The financial means placed at the disposal of colonists increased, to cover the costs of transport, preparation of land allotments, establishment of schools, veterinary stations, etc. The budget of 1924-1925 assigned 1½ million rubles to emigration; that of 1928-1929, 27 million.

The decline in migration after 1928 was due to the industrialization of the First Five Year Plan, which took up the slack of unemployment. Also collectivization of agriculture, which hampered individual initiative, placed greater value on the land. The Committee of Emigration expected to transplant over two million persons during the First Five Year Plan. After the initial spurt, however, coupled with the "liquidation" of the kulaks, the movement dwindled. The main reason was the failure to prepare for the colonists. Credits promised to the settlers did not materialize. The expected clearing of the land was only half carried out. As the land near the railways had been taken up, it was necessary for settlers to go farther north and east. Also, the organization of assistance to the colonists while en route was inadequate. There was a lack of proper railway cars, lack of hygiene, etc. Because of this disorganization the number of "returns" increased from 28.6 per cent in 1924-1925 to 62.2 per cent in 1929-1930 (from the Far East). The chief complaint of the colonists sent out by the center was that they arrived in a wilderness with empty hands.

Since the Committee of Emigration had functioned badly,

the work was transferred to the Commissariat of Agriculture for agrarian migration, and to the Commissariat of Labor for industrial labor. The agrarian colonization consisted chiefly of special groups (e.g. Jews to Birobidzhan, or former soldiers to Red Army Collectives, both types mainly in the Far East Region).

At the end of the First Five Year Plan the colonization movement practically ceased, owing to the demand for labor power in European Russia. In 1929 it was estimated that the excess of population of USSR was 6½ millions. But, for that surplus, occupation in near-by industry was more attractive than the risk of a long journey into Asia to an uncertain end. Moreover, the rapid improvement of agricultural methods (mechanization of agriculture, tractor stations, etc.) resulted in better yields, and the soil of European Russia could support more people.

With the Second Five Year Plan came a fresh reorganization. In 1933 colonization direction was taken away from the Commissariat of Agriculture and given to a new Committee on Colonization under the Council of Peoples Commissars, charged with the study of redistribution of the population. The scheme is to direct migration to new agricultural bases adjoining the new industrial centers, to supply

POPULATION OF THE SIX REGIONS OF SIBERIA

(January 1, 1933)

	<i>Area in thousands of sq. km.</i>	<i>Population (in thousands) Rural</i>	<i>Town</i>	<i>Total</i>	<i>Density per sq. km.</i>
USSR..	21,153 8	125,445 4	40,303 0	165,748.4	
Omsk Dist.	1,446.8	1,805.7	386.7	2,192.4	1.4
West Siberian Region	905.3	4,667 2	1,473 6	6,140 8	6.4
Krasnoyarsk Region	2,143.8	1,341.1	349.3	1,690 4	—
East Siberian Region	1,791.1	1,642.7	540.6	2,183.3	0.8
Far Eastern Region ..	2,954 2	1,122.7	737.4	1,860 1	0 7
Yakut ASSR..	3,030.9	274.9	52.6	327 5	0 07
	11,271.1	10,854 5	3,540.2	14,394 5	

them with both food and seasonal labor. Engineers and scientists were dispatched to prospective regions to study the soil, climate, etc., and to form estimates on the necessary work to be done—clearing, draining, road building. Until this work is finished emigration is in a state of suspension. New regions are being prepared to receive population, according to the General Economic Plan. It is expected that “planned” emigration will then set in on a vast scale.

The figures on page 105, compiled from the Bolshoi Atlas, 1936, do not indicate the percentage of Asiatic races in the

POPULATION OF ASIATIC RUSSIA⁴

Siberia and Far East

	1622	1796	1815	1858
Natives.....	173,000	363,362	434,000	648,000
Russians and others.	23,000	575,800	1,100,500	2,288,036
Total.....	196,000	939,162	1,534,500	2,936,036

1897 (census)

1911

Siberia and Far East:

Natives	870,563	972,866
Russians....	4,651,313	7,995,620
Others.....	238,320	397,849
Total.....	5,760,169	9,366,335

Steppe Region and Turkestan:

Natives.....	6,891,989	8,117,428
Russians ..	690,432	1,950,112
Others.....	164,297	259,493
Total.....	7,746,718	10,327,033

Total for Asiatic Russia..... 13,506,887 19,693,368

GROWTH OF POPULATION OF ASIATIC RUSSIA

1897.....	13,306,887
1911.....	19,693,368
1926. (Ossinsky's figures).....	23,949,000
§1933. (Including Sverdlovsk and Chelyabinsk Dists.)..	37,348,300

§ Note: How much of the 6,831,700 population of the two districts (Urals) should be included is doubtful. Therefore the comparative table cannot be scientific. The eastern parts of these districts were considered Asiatic.

⁴ Asiatskaya Rossiya, Vol. I, 1914.

regional totals. The estimate of Russians in Siberia's population is about 85 per cent. The table on page 106 gives the pre-war composition of the population of all Asiatic Russia.

IV. PREPARING SIBERIA FOR COLONIZATION

In comparison with other thinly populated areas of the earth Siberia has certain outstanding peculiarities.

First: Whether by historical accident, or because of remoteness in the days of slow transport, its rich and varied resources have been preserved almost intact from exploitation.

Second: Its political destiny and the "logic of geography" make it the territorial pendulum necessary to Bolshevism—the virgin field where a new civilization of new people can be built according to the socialistic principles maturing and evolving for two decades in European Russia.

Third: Its character is somewhat that of a Soviet state preserve, to be developed by modern science and planning according to the political, economic, social, and strategic needs of the Soviet Union as a whole.

Fourth: As a "planned" area its colonization possibilities cannot be measured by the coefficients used elsewhere. The Siberia being created by Soviet science and planning will be vastly different from the one which would have been produced by individualistic exploitation. The deliberate conquest over nature on a large scale, necessary to make Siberia habitable throughout, could be undertaken only by state means.

The above peculiarities of Siberia dictate the following principles for its development and affect its colonization:

Domination of the Plan

The six regions of Siberia are subject to the general plan, which dominates all activity. Spontaneous movement of individuals has ceased in practice, if not completely so in theory. Collectivized agriculture, about 95 per cent of the total in landholding and production, keeps the peasants within the plan regime. Collective farm groups, trained in European Russia, are transplanted *en masse* to newly opened lands. Industry is completely socialized, except for small handicraft

workers who do not hire labor. Trade is in the hands of the state or coöperatives controlled by the state. (The only private trade permitted is that of members of collective farms who may sell their share of surplus products after meeting the requirements of the state quotas.) Finally, persons of the "free" professions (e.g. doctors) are employed by socialist institutions. In general, the observation may be made: the more definitive the plan, the more restricted is the movement of individuals.

Population Movements Subservient to Industry

The cardinal principle in planning the new Siberia is that movements of population must be regulated by the need to exploit the natural resources and establish industries. The location of raw materials and energy determines the sites of industrial centers, which in turn dictate the location of agricultural communities for food supply, the direction of railways and roads, and the movement of individuals as builders in socialist construction.

Development of the Resources of the Soviet Union as a Whole

The basis of the plan was the decision taken by the Communist Party in 1930 to develop the resources of the Soviet Union as a whole. This decision was in keeping with the Bolshevik program of raising the economic and cultural level of the whole population and thus had particular significance for the backward areas of Siberia. It meant reversing the traditional flow of wealth in Russia, which had always been from the outlying regions to the center. Geographically it started the eastward movement, as though on a many-tongued conveyor belt, of all the elements of *material* and *personnel* necessary for the project beyond the Urals.

Concentration on Heavy Industry

The striking feature of the expenditure of capital pumped out from the center is the concentration on heavy industry, even in regions primarily designed for agriculture, timber exploitation, etc. Of the 12 billion rubles assigned to the six regions of Siberia in the Second Five Year Plan, over one

third was earmarked for construction in heavy industry, the greater part being in the West Siberian and Far Eastern regions. By a combination of local metals, fuel, and water power for electrification, these two regions are well endowed to become the most important centers for producers goods in all Asia and to supply other regions with machinery, agricultural implements, etc., on both sides of the Asiatic frontier.

Regionalization

Another feature of the decision of 1930 was the demand for a rational industrial geography, that is, a redivision of the map along the lines of regional economic significance. The boundaries of the national minority regions are more or less fixed, although the administrative status of a minority may be raised; e.g. from an Autonomous to an Allied Republic. In areas other than the nationality republics the method followed is to create new regions as new resources are discovered, with a view to effecting the best combination of economic utility and defense. While self-containment is not a prerequisite, each region is expected to develop its own local supplies of food and fuel, thus to reduce the load on transport facilities—the idea being that goods exchanged between regions shall be limited to specialties in surplus raw materials and finished goods.

This regionalization program, involving periodic changes of internal boundaries, is what makes the economic study of Siberia at the moment unsatisfactory (see changes in maps of 1928, 1930, 1934, 1935). No doubt the members of the Gosplan, on the basis of esoteric information about the smaller subdivisions, are aware of the total advance of industrialism from year to year. But the changes in size, of regions with given names, defeat any outside effort to estimate growth of regional activity. And the recent creation of the Omsk District precludes comparative study of development of six regions of Siberia as a whole.

Redistribution of Productive Forces

The scheme of regionalization according to major specialties involves redistribution of the productive forces on a

huge scale and the moving of industries out to the sources of raw materials. As a result, the industrial production of the national minority regions increased three and a half times during the First Five Year Plan, whereas that of the old industrial centers only doubled. The differential is expected to increase under the Second Five Year Plan. In such areas as Moscow and Leningrad, far from raw materials, industrial construction was ordered discontinued as from 1932.

The general plan revolves around a metal-fuel axis extending from the Urals to the Pacific. In this belt, served by the Trans-Siberian Railway, are found the three great combines which make the foundation of industrial Siberia: the Ural-Kuznetsk (iron at Magnitogorsk and coal at Kuznetsk basin); the Angarastroi, expected to furnish the cheapest electric power in the world from the hydro stations on the Angara River below Lake Baikal; and the Bureyastroi, on the Bureya River (tributary of the Amur), where coal and iron are so conveniently placed together that the industrial self-sufficiency of the Far Eastern Region seems to be assured. The function of an area already industrialized is not only to serve the center but also to industrialize the next region farther east.

Although heavy industry is the initial consideration, the food industry also is moving eastward to the supplies: meat-packing combines to Orsk, Semipalatinsk, and Ulan-Ude; fish canneries to Kamchatka; sugar factories to Kazakh SSR, West Siberian Region, Far Eastern Region, etc. Wheat growing has been extended northward and eastward. Light industry shares in the eastward trend, pushing out to the areas of industrial crops: e.g. cotton textiles to Central Asia; tanneries, boot and shoe factories to the steppe region of Kazakh SSR, etc.

Redistribution of Labor Power and Urbanization

In the 1926 Census the town population of USSR was counted as 25 millions; in 1933 it was estimated at 40 millions (based on municipal reports)—a change from 18 per cent to 23 per cent of the total. In 1914 there were 16 cities of over 100,000 population; in 1926, 31; in 1933, 65. In 1936 there were 767 towns, 712 workers' settlements, and

1667 urban settlements (village soviets numbered 63,011). From these figures, page 92, it may be noted that between 1928 and 1934 the proletariat (workers and employees) increased from 26,343,000 to 47,118,000, and the number of persons employed in state economy (which excludes collective farms and coöperatives) from 11,599,000 to 24,769,900.

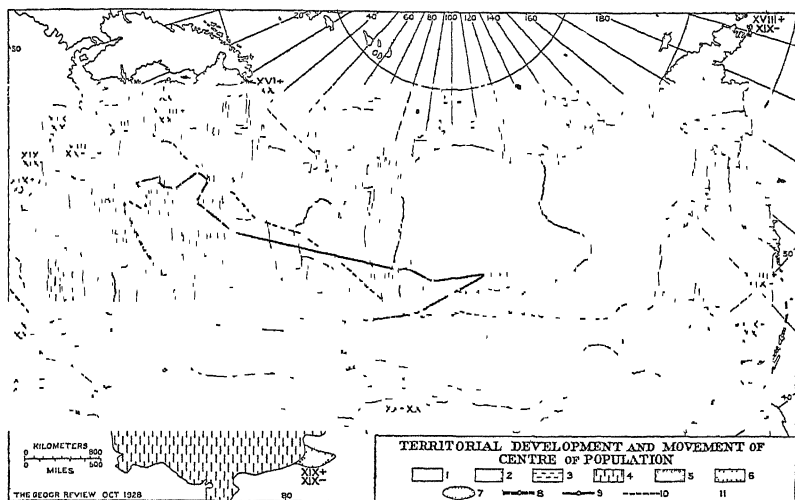


FIG. 5. Historical development, compiled by B. Semenov-Tian-Shansky. Territory acquired by Russia in: 1, sixteenth century; 2, seventeenth century; 3, eighteenth century; 4, nineteenth century; 5, twentieth century; 6, lost territories; 7, over 50 per cent Slavs in the population (twentieth century); 8, movement of center of population; 9, movement of center of territory from 1500 to 1926; 10, northern and western boundaries of the Mongolian-Tatar dominion of about 1300; 11, defensive lines against nomads and Caucasian mountaineers in sixteenth to eighteenth centuries. (Courtesy of *The Geographical Review*.)

The territorial movement of industry and the corresponding movement of labor power set in motion a phenomenal wave of town building unprecedented in history. The plans for new towns are elaborated by a special state-planning organization called "Giprogor." Sections formerly uninhabited become populous centers with extraordinary rapidity. Besides the large cities, which actually spring into existence on the site of a large-scale enterprise, such as Magnitogorsk, or Stalinsk, there are hundreds of middle-sized towns, workers' communes, kolkhoz or sovkhoz centers, tractor stations, etc.

The extent of urbanization east of the Urals cannot be determined from the information available. During the First

Five Year Plan the population of the whole Union increased by 12.2 per cent, while that of the eastern regions increased 24 per cent. In the six regions of Siberia, in 1936, there were 60 cities, 7588 villages, and 100 workers' communes. The celebrated Russian scientist, Professor D. Mendeleev, predicted that, considering the possibilities of settlement, the center of gravity of Russian population would eventually be in the neighborhood of Omsk.⁵ While this prediction cannot be substantiated, a brief purview of regional specialization may give clues as to the sections most likely to be selected for large-scale planned colonization.

Regional Specialization and Colonization

The specialization of regions according to their economic contents is of primary consideration in planning population movements. Strategic reasons may demand the immediate settlement of sections less favorable than others. This is evident in the granting of privileges, tax exemption, etc., to colonists in the newly opened districts along the Manchurian border.

As an example, the decree of December 12, 1933, provided that collective farms in certain districts of the Far Eastern Region are to be exempt from the obligation to supply products to the government for ten years and exempt from taxes for fifteen years if virgin soil is cultivated. Also, the wages of workers in the region were to be increased from 10 to 30 per cent, and the minimum wage level subject to income tax was raised from 150 rubles (as elsewhere in the Union) to 200. Similar inducements, though for shorter periods, were offered to settlers in the East Siberian Region and at points farther west. A general conclusion is that the Soviet government, although not ready to announce an all-round scheme of colonization, has determined to populate the eastern border lands as speedily as possible. That this acceleration of a natural process is due to the Japanese occupation of Manchuria is no longer open to doubt.

The following table presents evidence of the growing in-

⁵ D. Mendeleev: *K Poznaniyu Rossii* (Toward Knowing Russia), St. Petersburg, 1906.

See also Benjamin Semenov-Tian-Shansky: Russia: Territory and Population; A Perspective on the 1926 Census, *Geogr. Rev.*, Vol. 18, 1928, pp. 616-640.

dustrialism of Siberia, the increase of the sown area, and the mechanization of agriculture, which indicate capacity to absorb more population.

BASIC INDICATORS OF THE DEVELOPMENT OF THE SIX REGIONS OF SIBERIA

According to the Second Five Year Plan (1933-1937)

Capital Investment—12,067,250,000 rubles (1926-1927 prices)

	1932	1937
Industrial production:		
Electric power (millions of kw.)	359 6	2,115.1
Coal (thousands of tons)	11,190.0	31,000 0
Oil (thousands of tons)	202.8	800 0
Mineral ores (thousands of tons)	298.2	3,234.0
Cement (thousands of tons)	167.0	755.0
Paper (thousands of tons)	60 0
Meat (thousands of tons)	50.2	136.0
Fish catch (thousands of tons)	395 8	441.7
Bricks (in millions)	387 0	1,224.0
Timber (millions of cubic meters)	18.3	48.1
Textiles (millions of meters)	6.47	73.3
Footwear (millions of pairs)	1.55	11.0
Agriculture:		
Area under crops (thousands of hectares) .	10,203.0	12,396.0*
Livestock:		
Cattle, sheep, pigs (in thousands)	10,784.7	23,362.3
Horses (in thousands)	2,737.0	3,102.0
Motor tractors (in thousands of horsepower)	293.5	820.0
Services: education and health:		
Students (in thousands) in:		
Primary and secondary schools	1,850.2	2,493.0
Universities	23.0	48.0
Technicums	48.4	91.6
	<hr/>	<hr/>
	1,922.2	2,632.6
Hospitals and medical aid stations	973	1,852

* Exceeded in 1934.

Far Eastern Region

As the Pacific outlet, the Far Eastern Region is one of the most important areas of USSR. Military strategy demands

that it shall become self-contained as rapidly as possible. The climate is milder than that of the interior but less dry. Recent surveys indicate an abundance of minerals. Bureyastroi, the third metal-fuel base on the power axis from the Urals to the Pacific, will not begin to take form until the Third Five Year Plan. But regional specialties already in production include: shipbuilding (reconstructed shipyards at Vladivostok, and a new one at Komsomolsk on the Amur), gold mining, oil refinery (at Khabarovsk, supplied with oil from Sakhalin), metallurgy (at Komsomolsk), timber, and food (especially fish, one-fourth of the total catch of USSR). Transport construction includes the Baikal-Amur Railway which crosses the Amur at Komsomolsk and continues to the rapidly developed port of Sovietskaya Gavan. Other lines are in process of construction which within a few years will make the Far Eastern Region one of the best served by transport.

Just what part the Red Army plays in the industrialization of the area can only be imagined. The presence of large bodies of troops (estimated at 300,000) makes a problem of regional food supply.

There is abundance of good land yet to be opened around Lake Khanka, in the Ussuri Valley, and the Bureya and Zeya sections. The Jewish Autonomous District of Birobidzhan is the best example of Soviet-planned colonization thus far. In 1926 its only inhabitants were about 32,000 natives. After the decree establishing the Autonomous District for Jews (March 28, 1928) the influx of Jews steadily mounted until the total number in 1935 was 15,000. It is expected that 150,000 new immigrants will arrive in Birobidzhan during the Third Five Year Plan.

The total population of the Far Eastern Region in 1933 was 1,860,100. Because of its strategical importance, variety of resources, and abundance of land, coupled with a favorable climate, it is to be expected that the region will receive first consideration in Soviet colonization plans.

East Siberian Region

Likewise important in the strategy of defense is the East Siberian Region, the springboard into Outer Mongolia. It in-

cludes the Buryat-Mongolian ASSR, one of the model nationality republics. The regional specialty is heavy industry. The Angarastroi, to provide cheap electric power, is designed to supply other regions as well. Agricultural possibilities, however, are limited by the mountainous character of the plateau. On the other hand, it is bound to become a traffic center (the Ulan-Ude-Kyakhta-Ulan Bator Railway, the Lena Railway, the Angara-Lena Highway, Darasum-Kira Highway, etc.). Migration to this region will probably be mostly industrial and urban.

West Siberian Region

The West Siberian Region is the most attractive part of Siberia. It combines industry and agriculture in an almost ideal way. The mineral riches are among the most valuable of the Union (the Kuznetsk section is the eastern end of the Ural-Kuznetsk Combine). As it is situated in the black soil belt, the possibilities of agricultural colonization are considerable. Urbanization is well advanced, especially in the mining districts. (Between 1926 and 1933 the towns that increased their population include: Novosibirsk, 125,382 to 310,000; Anzhero-Sudzhensk, 21,600 to 77,000; Kemerovo, 21,500 to 124,000; Prokopievsk, 10,000 to 121,000; Stalinsk, 3,900 to 220,000.) It is not unlikely that the West Siberian Region will eventually become the most populous industrial-agricultural area of Asia.

Other Regions

In viewing the other regions of Siberia, the predominant impression is one of great space and rigorous climatic conditions. The Omsk District is notable for agriculture and fish; the Krasnoyarsk Region has first place in timber supply east of the Urals; while Yakut ASSR assumes strategic importance as air lines develop for Trans-Pacific connections. In all three regions industrialism has importance but less so than in the three already mentioned. Their development as a group depends somewhat upon the Northern Sea Route which promotes settlement on the Arctic shores and along the rivers. They are likewise concerned with the advance of polar agri-

culture which is expected to make the northern settlements self-contained in food supply. In general, they must remain of secondary importance for colonization, even though the thriving sawmill town of Igarka, within the Arctic Circle, does indicate that the Far North has possibilities for habitation. As proof, the statistics show that the population of the Far North, from Murman to Bering Strait, increased between 1926 and 1935 from 656,000 to 1,176,700 and in the Siberian section of the Far North from 526,100 to 895,400 during the same period.

V. POLITICAL SIGNIFICANCE OF INDUSTRIALIZATION IN SIBERIA

Because of the future relationships between Siberia and the rest of Asia, brief mention should be made of the political aspects of the growing industrialism.

Bolshevik principles in dealing with racial minorities within the Union may be summed up as: self-determination for the "toilers" of any nationality; the right to secede and form independent states; equality for all races, privileges for none; federal brotherhood for the common task of building socialism.

Their method of achieving racial identity for each national minority includes political training in citizenship ("nativization" of the local Soviet apparatus); economic development of the nationality regions with capital pumped out from the center; and cultural autonomy, which is "socialist in content and national (racial) in form."

One point of political significance of the industrialization of Siberia is the possible absorption into the Soviet system of the nomad lands of old China. The People's Republics of Mongolia (Outer Mongolia) and Tannu Tuva are, in practical politics, already part of the Soviet domain. The attraction toward the Soviet Union for the border peoples is the natural blood relationship with the races on the Soviet side of the frontier, the promise of economic and cultural modernization with Soviet aid, and the need for protection. Granted that autonomy for the nationality regions is likely to increase with their prosperity, there might ensue a loosen-

ing of the Soviet economic system which conceivably could take the form of a Customs Union for mutual benefit between the USSR and the "client" states along the border.

While this tendency does not prevail in the Middle East, still the economic relations of Turkey, Persia, and Afghanistan point to increasing import of Soviet machinery, etc. Industrialization beyond the frontier is in keeping with the plan for general promotion of the eastern markets.

Finally, the push of Soviet power to the Pacific along the three main lines (the middle drive along the railways, the main belt of industrialization, and the power axis; the southern flank, through the nomad lands of old China; and the northern flank, the Northern Sea Route, and development of industries on the Arctic shore and Siberian rivers) may well prove to be one of the most important developments of the postwar period of politics in the Far East.

VI. CONCLUSION: POPULATION CAPACITY OF SIBERIA

Until the Soviet government completes and publishes its surveys of regions for colonization any attempt to estimate the population capacity of Siberia is premature. Materials based on incomplete exploration do not permit a secure judgment. Moreover, Siberia is virgin territory for the application of socialist principles and a strategic area in Bolshevik Asiatic policy, where the variable factors of Soviet science and planning have already achieved startling results in building civilization. The rapid opening since 1930 of new resources and new lands, along with extensive construction of industrial plants, mechanization of agriculture, improved utilization of land—all suggest a population capacity greatly above the figure of 14,394,500 given for 1933.

While redistribution of labor power eastward from the centers of European Russia has been a steady process, the big colonization program is still in the future. If Dr. Dublin's computation is correct, the population of USSR will double itself within the next 40 years, making a total of about 340 millions by 1975. Such a high reproduction rate suggests that

labor power for the building of the new Siberia can be supplied from within the Union.

Immigration from abroad into USSR has been insignificant and mostly across the Asiatic frontier. The Bolsheviks have always offered asylum to political refugees. Foreign skilled workers also have been welcomed and automatically granted political rights (to vote and be elected to the Soviets). The peculiarity of the Soviet system requires that such immigrants fit into socialist society, and share in its future, which is to forego easy return to their homelands. The most likely immigrants, from the ideological point of view, would be from the Asiatic border countries. Other than the Chinese, Asiatic immigrants generally lack industrial skill. Nevertheless, it is probable that the bars to immigration from abroad would be lowered on the Asiatic frontier before they would on the European.

Finally, the whole question of immigration into Siberia is bound up with considerations of military strategy in the East and the Bolshevik assumption of tutelage for the backward peoples of Asia.

THE MAINSPRINGS OF ASIATIC MIGRATION

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SINCE the beginning of the twentieth century the most conspicuous phenomena of Asiatic migration have been (1) the colonization of great areas in Manchuria and Inner Mongolia by millions of Northern Chinese, under Chinese rule; (2) the great part played by Southern Chinese in the development of Malaysia and Netherlands India, under British and Dutch rule; and (3) on the negative side, the failure of the Japanese to migrate in any considerable numbers from Japan Proper to the colonial territories of the Japanese Empire. Migration from India to Malaysia and the islands of the Pacific is probably comparable, in a general way, to migration from Southern China. The willingness of the Japanese to migrate to California and Australia, if not prevented by exclusion laws, and the fact that Japanese will go as traders to regions where they do not go as colonists, are phenomena of a different order.

So striking has each of these phenomena been in its own way, however, that there has been a tendency to classify and explain them according to theories of race and climate: Chinese from the sub-tropics of Kwangtung and Fukien, it is pointed out, go to Malaysia, Siam, the South Seas, and Netherlands India. This must be because the climatic adaptation required of them is not as difficult as the adaptation that would be necessary if they had to face the severe winters of Manchuria and Inner Mongolia. They can also continue to grow rice in these warmer regions, as they did in their home provinces. The Northern Chinese, on the other hand, have to endure in Manchuria and Inner Mongolia a climate not much more severe than that of Shantung or Shansi, and can continue to cultivate

the grain crops to which they have always been accustomed. The physical differences between Northern and Southern Chinese are obvious; it is likely, therefore, that the Southern Chinese are racially fitted for southern migration, and the Northern Chinese for northern migration. The Japanese, on the other hand, if they go south have to cope with climates noticeably more tropical than that of Japan; if they go north they have to adapt themselves to an equally great change in climate. Given the racial differences between the Japanese and either the Southern or Northern Chinese, the combined factors of racial predisposition and climatic adjustment handicap the migration of Japanese much more than that of Chinese.

Explanations of this kind are based on a limited range of evidence, and the range of evidence which they ignore is much greater. For instance, the Chinese in Alaska are not hardy northerners from Shantung and Shansi, but subtropical southerners from Kwangtung and Fukien. The Japanese, as fishermen, are as efficient in the cold and stormy seas off Siberia and Kamchatka¹ as they are in the warm seas of the Pacific islands and off Australia. Moreover, as colonists, they do not settle on the land in Formosa, which is part of the Japanese Empire, but do settle in both Brazil and California, under alien rule. In California, incidentally, in spite of the fact that here also they have to face Chinese competition, the Japanese truck gardeners hold their own, and the Chinese engage in trade to a larger extent than do Japanese. Even in the modes of Chinese migration there are discrepancies. The subtropical Chinese who make a successful living in Alaska do not make it by cultivating rice. Yet in Manchuria, where rice is cultivated and the area under cultivation is increasing, it is cultivated neither by Northern nor by Southern Chinese but by Korean immigrants.

At this point a historical approach will help to classify the problems that have to be considered. China is the best country to take as an example, both because of its territorial bulk and climatic range and because of its great population.

¹ It should be noted that fishing in northern waters is a seasonal occupation and the fishermen are there only from the beginning of May to the end of August. (*Edit.*)

In the most primitive phase of Chinese history of which any record has been preserved, there appear to have been two main streams of migration, not *from* China but *toward* the center of China—one from northwest China and one from what is now Indo-China. The two met in the general region of the Yangtse valley. The migration from northwest China was associated with the spread of an intensive technique of agriculture originally developed in the loess highlands. This technique fostered an early development of irrigation, because the loess country was fertile if there was enough water, but the rainfall was irregular—two factors which, taken together, led to the irrigation of fields with water taken from rivers.

The early Chinese, who developed this technique, then began to spread into the lower Yellow River valley, the great North China plain. Here they had to deal with conditions that were different but not too different. Irrigation remained important, but still more important was the draining of marshes and the building of dikes, both made necessary by the flooding of the Yellow River. The technique learned from irrigation in the loess regions was adapted to these problems. There arose, as a result, a social economy that was primarily agricultural. Irrigation favored intensive as against extensive agriculture, and draining and diking led to the development of transport canals.²

At about the same time, migration from the south was resulting in the spread of a jungle agriculture and its development toward higher forms. It was based on rice, not on the millet and wheat that were the staples of the north; but it also resulted in intensive agriculture and an early development of engineering technique. The rainfall of the south was relatively regular, but technical advances in the cultivation of rice brought about the terracing of hillsides and the distribution of water by irrigation works.

The two currents of migration encountered each other in the Yangtse valley, and by the time of the Han dynasty of B.C. 206 to A.D. 220 it was already apparent that the north-erners were destined to become politically dominant. This was

² Ferdinand v. Richthofen: *China* (5 vols.), Berlin, 1877-1912; Karl A. Wittfogel: *Wirtschaft und Gesellschaft Chinas*, Leipzig, 1931.

partly due to the development of military technique in the north as the result of constant wars against the steppe nomads of Mongolia and Central Asia, but it was also the result of other factors, which there is no room to discuss here.³ The final domination of the northerners, in the provinces far to the south of the Yangtse, took centuries, but in the end it reversed the original stream of migration from the south. The ancient migrants from the south are now represented by the Miao, Yao, and other "aboriginal," non-Chinese tribes; while the southern Chinese of Kwangtung, Kwangsi, Kweichow, and other provinces, who are gradually exterminating them or driving them still farther south, are themselves the descendants of an interbreeding process, at different historical periods and in different racial proportions, between northern Chinese and southern jungle-people.

The result of this long historical process was the greatest agriculturally based empire, in extent of territory and size of population, of which we have any record. Nor was it so sharply divided from the rest of the world as is sometimes assumed. Through the agriculture of rice and tea we can trace affinities far south and southwest into Siam, Burma, Assam and the eastern side of India. Through gradations in the technique of irrigation we can trace another range of affinities from the loess of Northwest China to the oases of Central Asia and from Central Asia to Northwest India and Persia. This means that if the working processes of migration in China can be established, the conclusions drawn can largely be applied, with suitable modifications, to virtually the whole of Asia.

What were the cardinal characteristics of this Asiatic social economy, taking China as the example? Agriculture was the primary method of creating wealth; the norm of agriculture favored intensive rather than extensive cultivation, and grain was the primary commodity. Tangible wealth, in the form of stored grain, became and remained the real standard of power, in spite of the fact that money developed very early and had, within limits, a great importance. Grain was the real standard of transport, and therefore canal engineering

³ Chi Ch'ao-ting: *Key Economic Areas in Chinese History*, London, 1936, pp. 78-80.

was more advanced than road engineering, because grain can be transported at the minimum expense by inland waterways. Grain was the real standard of military power, and military power inland, in consequence, the rationing of troops from grain stores; with the result that infantry was more important than cavalry, and siege warfare was more important than campaign strategy. Grain was the real standard of government, and in consequence the power and stability of a government were gauged by its ability to collect a tax in grain from the land and concentrate it, by inland water transport, in central depots. Finally, grain was the real standard of social and financial power, and therefore the landlord and the local usurer never surrendered control to merchants, manufacturers, and centralized banking credit.

For these reasons the emperor himself was a deified landlord, and the bureaucrats who operated the machinery of government were chiefly drawn from the landed gentry. Cycles of centralization and of regionalism alternated according to the concentration of grain revenue in the hands of the deified emperor landlord or in the hands of the mundane regional landlords, but it is safe to say that during the last 2000 years the local landlords, who stood closer to the grain revenue and could intercept it on its way to the emperor (who theoretically personified them as a class), held the real power for a good deal more than half of the time. Both they and the emperor, however, intervened whenever trade or manufacture threatened to create theoretical forms of wealth that would have displaced grain, the revenue from the land, from its commanding position.

Within a structure of this kind, the migration of both people and wealth was limited. It was only toward the south that migration continued as a steady process, expressed in the slow clearing of the jungle and the creation of closely-settled communities, providing land revenue and land taxes. The development of mountainous regions was stultified, because difficulties of transport limited the movement of grain; and the government, representing the landed interest, crippled by taxation the technical development of mining, which might otherwise have created other forms of wealth and stimulated the exchange of

other commodities than grain. The most typical form of enterprise in the mountains was therefore the wasteful destruction of forests.

Expansion toward the north was limited by the steppes. Chinese agriculture, ranging as it did from the subtropical south to the relatively cold and arid north, was flexible enough to allow an extensive agriculture along the edge of the steppe, in spite of its bias toward intensification. Transport and the form of society, rather than the technique of agriculture, were here the limiting factors. When the Chinese reached the cultivable fringe of the steppes, they passed beyond the zone of cheap transport by river or canal. Grain could no longer be profitably concentrated toward the centers of power in China. Even the trade in grain from the cultivated fringe of the steppe went out into the steppe rather than back into China, because only in the steppe could it be carried cheaply, by caravan animals grazing as they moved and not having to be fed at inns.

The jealous interests of the dominant landowning classes prevented the Chinese from spreading farther into the steppes by adopting a pastoral economy. Livestock carries further even than extensive agriculture the "extensive" principle in economy. Chinese who adopted the steppe economy tended to break away from the Chinese society and become "tribal barbarians"; just as tribal conquerors of China from the steppe, in proportion as they penetrated into China and, abandoning their own extensive economy, exploited the intensive economy of China, were transformed from barbarian conquerors into part of the ruling class of China.

Migration across the sea was also limited. There were virtually no lands within close enough reach to provide an addition to the grain revenue that was the standard both of the Chinese Government and of the only group within China—the landowners—capable of financing large ventures. The landowners were also responsible for preventing the growth of industries manufacturing commodities in quantity and by cheap methods, providing a surplus for export. The typical Chinese artisan and handicraft commodities were either iron and brass utensils and cheap cloth, which permitted exchange

over short distances between town and country, or luxury goods like silk, porcelain, and tea, which could be profitably exported to the steppes and to Central Asia but which in trade with the parts of Asia that could be reached by sea came into competition with similar wares and products locally produced.

It was therefore typical of China that both grain transport and commodity trade moved inland—along the Grand Canal, which runs almost parallel to and not far from the coast, and which was dug at an expense that can never be calculated—rather than by coastal shipping from the mouth of the Yangtse to North China. Along the coasts of the southern provinces, where mountains prevented the extension of the Grand Canal, trade between north and south created a more lively exchange by shipping, and consequently such distant seagoing activity as China ever developed was a monopoly of the south. It even led to long voyages to Malaysia, India, and even Arabia; and Arabs, Malays, and others came, in turn, to Canton. The traffic, however, was always intermittent rather than regular. It represented a quest for rarities, treasures, and curiosities, not a steadily developing trade in what we now call “consumer’s goods.” It therefore fluctuated according to the creation of great and stable states in China, India, Persia, and so forth—which themselves represented quiet intervals in a turbulent and fluctuating history. Dependence on luxuries, and intermittent activity, were almost as characteristic of other Asiatic maritime traders as they were of the Chinese.

It will be seen that both the movement of peoples and the spread of forms of economy and society were, in Asia, more closely associated with great contiguous land areas than with oversea activity and that the peoples of Japan, Java, Malaysia, and so forth must, if Asia be taken as a whole, be considered peripheral and exceptional. They did not represent the central stream of Asiatic history, and their activities did not greatly affect the course of history. Although China has here been cited as the chief example, it is plain that the principles discussed can also be applied to most of the rest of Asia. To bring about cardinal changes, a new principle was required;

and when this principle appeared, it did not originate in Asia, but was imported into Asia from Europe and from the European system as it was established in America.

Asiatic migration of the present day is, in fact, an Asiatic phenomenon only in a secondary sense. What creates it is the activity of Europe and the West—an activity developing out of the rise first of merchant capital, then of industrialism, and finally of the free investment of capital all over the world. Without diverging to consider the reasons that made this process begin in the West, it may be pointed out that the chief characteristics of the new phenomenon were flexibility and range. The Western economy was able to migrate in ways which had never been possible for economies originating in Asia. It penetrated masterfully even into Asia itself, and from that time the old Asiatic forms of human migration became increasingly subject to the initiative and control of the migrations of Western trade, industry, and money.

The Chinese field of migration shows very clearly the kinds of change. The old southern current of migration filtered slowly through the jungles and mountains toward Indo-China, forming "pools"—Chinese communities homogeneous with the main expanse of the Chinese economy and society. The "pools" in time overflowed, and the current filtered toward the south again. There was no deep penetration of individual settlers or small bodies far beyond the main front of advance; but, partly because of the difficulty of river, canal, and road transport, there was a more considerable fringe of coastal traders than there was in the north, and Chinese junks went as far as Singapore and Java and, much more rarely, even farther. This fringe, when the much stronger and more far-ranging Western forms of activity began to become important, tended to adhere to it as well as to the Chinese economy of which it was an offshoot. Thus, the oversea activities of the Southern Chinese may be described as the result of the economic revolution effected when the steamer displaced the junk as the vehicle of communication between China and Malaysia. It led also to a revolution in the form of migration, for it became possible for the Chinese to overleap, by the use of the new forms of sea transport, the land front of tedious

penetration toward the south. The agencies concerned relied at first very largely on foreign capital; that is to say, Chinese who could not finance their own migration went to work for foreigners who had the money. In the course of time, however, those of the Chinese who were successful accumulated capital themselves, and this they used very profitably in financing further migrations of their countrymen.

Turning for comparison to the northern front of Chinese migration, the point to be noted first is that under the old conditions there was a limit in the north to the spread of the Chinese economy. In the south there was no real limit; the increasingly tropical climate made necessary certain changes in the crops grown; but the Chinese economy, being based on intensive culture, maximum use of human labor, accumulation of stored grain as the most solid form of wealth, and land revenues as the chief source both of private wealth and government finance, was flexible enough to adapt itself from the crops and details of method required in the Yangtse valley to those required farther south. In the north, the approach toward the steppe limited the expansion that was possible by adaptations or modifications of the intensive method of agriculture and made necessary a radical change from intensive to extensive agriculture. Since the social and state forms that could be based on an extensive agriculture were different in certain vital respects from those that could be based on an intensive agriculture, and since the society from which the northern Chinese came had a vested interest in the intensive forms, migration was limited not only by the resistance of the pastoral nomads of the steppe, but also by the unwillingness of the forces which controlled China to allow migrants to escape from the system they dominated by setting up an alternative economy.

For these reasons the northern front of Chinese migration faded away into an indeterminate zone of mixed economies, in which were to be found steppe peoples who had partly adopted the steppe economy of livestock. This mixed economy never achieved a stable form of society and state of its own, however, because of the recurrent tendency of nomads who had adopted some degree of agriculture to migrate *away* from

the steppe and toward China (partly by conquest), thus assimilating themselves to the main body of China and detaching themselves from the steppe. As a counter phenomenon, Chinese who had begun to devolve (so to speak) from the intensive economy of China toward the extensive economy of the steppe often tended to shed their agriculture altogether, to detach themselves from China completely, and to merge among the steppe peoples.⁴ In other words, the steppe of Mongolia, fading out on the east in Manchuria and on the west in Central Asia, and the great bulk of China, with its irrigation-agriculture, were each the pole of a strongly independent economy, neither of which ever completely overcame the other. Between the two, on the margin of the steppe, there fluctuated erratically smaller communities attracted in alternation toward one pole or the other.

As the coastal navigation and seagoing junks of the south formed a fringe along the flank of the southern expansion of the Chinese, so, in the north, trade by cart and caravan between the relatively dense population of China and the relatively thin population of the steppe formed a fringe which extended beyond the zone in which successful Chinese colonization was possible. Because of the lack of rivers for either transport or irrigation, the region in which an extensive agriculture was possible could not be bound closely to the main body of China. It could not form part of an economy in which the arterial flow of the system of circulation consisted of the movement of surplus grain toward centers of storage. Grain that had to be transported by animals could be carried only a short distance before the amount eaten up by the animals wiped out the margin of profit. Such grain trade as existed, therefore, went outward from China toward the steppes, carried by caravan animals which grazed on the free steppes and did not consume the valuable grain cargo.

Just as the junk traffic to the south was transformed when steamers came into use, so the cart and caravan traffic of the north was transformed by the introduction of railways. Because railways could carry back toward China at a profit grain grown by extensive methods of cultivation on the steppe, it

⁴ Owen Lattimore: *The Mongols of Manchuria*, New York, 1934, pp. 85-87.

became possible for the first time in Chinese history to link an extensive frontier agriculture closely with an intensive domestic agriculture. The great modern Chinese colonization of Manchuria, north of the limited zone which had always been homogeneous with China, and the greatly increased depth of Chinese penetration into Inner Mongolia, must be attributed not to any special adaptability of the Chinese as agricultural colonizers, nor to any racial superiority of the Chinese in facing the Mongolian and Manchurian climate, but to economic factors that made possible the closing of the age-old gap between China and the steppe.

In fact, if we compare the northern and southern methods of Chinese migration we see that in the contemporary phase no factor of geography, climate, or race even approaches the vigor of the economic factor. Moreover, the economic urge toward migration from densely settled regions in search of thinly settled regions is insignificant, except where it draws vitality from the penetration of the methods of advanced contemporary capitalism into new fields of enterprise. It may therefore be said that the character of Asiatic migration as a whole has less to do with climate and the adaptability of race than it has to do with the vigor and adaptability of capital enterprise. Where capital is able or willing to penetrate, population will follow; and it will follow not because it finds the climate or the working conditions that it prefers, but because it has itself been selected as suitable raw material by those who control the capital. That this is true can be proved by reference to the most diverse regions and races. Chinese have gone to Malaysia just as people have gone from India to Fiji: because the governing interests in those regions elected to preserve, to a certain extent, the land rights of the native Malay and Fiji population. Being protected by land laws from the economic pressure that would force them into the labor, of all kinds, which the development of these territories demanded in order to make capital investments profitable, it was necessary to find elsewhere an unprotected population whose poverty would make it willing to do the work at profitable rates. The maritime fringe of southern China, to take only one example, was a rich recruiting ground, because

the old maritime activities were being broken down by the introduction of steamers, and the junk-going population formed a link with the shore dwellers, so that it was possible to turn what had formerly been a trickle of south Chinese oversea movement into a steady stream. In the north, the Mongols of the steppe were not protected by land laws, and here, in consequence, it was possible to expropriate land in enormous quantities and plant Chinese colonists wherever the crops they grew could profitably be transferred by rail to the market, which had been out of reach under the old transport conditions.

Only the simplest of the factors involved have so far been considered, and it is necessary to review factors of a much more complicated kind if the whole scope of modern Asiatic migration is to be understood. There is, for instance, not only the question of the invasion of countries like China by foreign capital, but the question of the changes brought about in China by the adoption of Western methods by Chinese. It is now more and more generally recognized that such an incident as the "Opium War" of 1840-1842, between China and Great Britain, did not really originate in any moral question of whether the Chinese were to be saturated with opium or protected from it. The war broke out only after the derangement of Chinese economy by the invasion of Western economy. It made it plain that new forms of economic activity were necessary if the capital which the Westerners were anxious to put to use was to be profitably employed. In the earliest period of Western contact with China, trade consisted largely of the purchase by foreigners of luxuries from China. They could not sell goods in sufficient quantities to pay for the luxuries, and in consequence they paid for their purchases largely in bullion. In order to find some method of creating a two-way trade they searched patiently for goods that would find a sale in China. Opium proved the successful solution; so successful that it reversed the trade balance and caused an outflow of bullion from China. Once the financial value of opium had been demonstrated, it was impossible to suppress the trade, although agreements between China and Great Britain did for a few years greatly decrease the con-

sumption of opium. At the present time opium has revived strongly. Just as the foreigners found that the import of opium was profitable in the nineteenth century, so the Chinese have found that the penetration of opium deeper and deeper into the hinterland is profitable in the twentieth century. Opium represents high value for small bulk and weight. It can be brought from the remotest parts of China at a profit and thus extend money circulation into regions that would otherwise be economically isolated. Moreover, the string of tax stations reaching from the center of China toward its farthest frontiers makes it possible to use the financial profits of opium as a means of political centralization.

The conversion of opium from a method of foreign invasion into a powerful but dangerous financial and political tool in China itself, is an example of the interacting processes by which the Western invasion of all Asia has been partly transformed within Asia.

It has been shrewdly pointed out that the degree of national independence in Asiatic countries depends partly on the extent to which Asiatic countries anticipate Western conquest by conquering themselves.⁵ Thus, in Japan, the old ruling class escaped Western conquest by taking over the Western forms of power and with them conquering or reconquering their own people. Since then, Japan has maintained itself as a great power by developing an Asiatic imperialism which underbids Western imperialism just as Japanese trade underbids Western trade. In China also processes of the same kind have been started, but they have never developed so far as in Japan. Nevertheless, it is possible to point to a potential westernized China that would underbid and undercut Japan just as Japan underbids and undercuts the Western nations; and in such a China there would be, so to speak, an "imperial" stratum of Chinese ruling over the more backward Chinese, just as in Japan an imperial stratum possessing factories, banks, and military and naval forces rules not only over Koreans and Formosans but also over the peasants of Japan, whose rice-paddy agriculture and economy, based on

⁵J. H. Boeke: *The Recoil of Westernization in the East*, *Pacific Affairs*, September, 1936, pp. 333-346.

manual labor, are just as "imperiallly" subject to the ruling of the Japan of Tokyo and Osaka as India is subject to Great Britain.

Thus there can be seen in the contemporary Far East a wide gradation of forms. Under British, Dutch, and French rule, cheap Asiatic labor creates dividends for European capital, which can therefore be exported to the Far East more profitably than it can be employed in reviving the depressed economic areas of the home countries. Under Japanese rule, Japanese, Korean, and Chinese labor (as in Manchuria) can be similarly employed to create Japanese dividends; but only by imposing upon the subject part of the population in Japan as well as in the Japanese Dominions an even lower standard of living than that of the Asiatics who live under European rule.

Still a third degree of this process can be seen struggling to establish itself in China, under Chinese rule. China cannot simultaneously create industrial and political independence like the Western nations, unless it accumulates capital like the Western nations. To accumulate capital, Chinese factory hands working for Chinese investors must submit to even lower wages and worse working conditions than Japanese factory workers, because competition in Asia today works at three levels; the West imposes its standards on the East, Japan underbids the West, and China threatens to underbid even Japan.

Migration follows the same three levels. The concentration of capital for investment demands an unequal distribution of profit within each country. Industrial Japan prospers at the price of agricultural depression, because financial Japan is weaker than its Western competitors and can make profits only if its own peasants are made subservient to its industrial and financial interests, providing cheap labor and consuming so little that profits must be made out of the export market for lack of a domestic market. Even so, the rate of capital accumulation is limited, and therefore capital relies also mainly on export markets. It is because Japanese capital seeks industrial and commercial employment, and avoids agricul-

ture, that the Japanese do not emigrate to settle on the land.⁶ This is demonstrated indirectly by two of the limited forms of Japanese colonizing emigration, in Brazil and in California. In Brazil what gives life to Japanese migration is the combination of government subsidy and commercial profit for banks, shipping lines, and so forth.⁷ In California, it is the ability of the Japanese to use limited capital resources in underbidding Western methods of agriculture—a process cut short by the American exclusion laws, but surviving, among the Japanese already established in America, in a form that reveals the characteristics of the process.

In China the migration of capital and the migration of people have now become deeply entangled with politics. The migration of Chinese to Manchuria, for instance, is now no longer a question merely of space available in Manchuria and of migrants available from famine districts in China. The ruling factor is the profit of Manchuria to Japan. It is because of this factor that actual Japanese colonization in Manchuria is likely to remain nominal. The chain is as follows: the ability of Japan to expand commercially and imperially demands the subordination of Japanese agriculture to industry. For this reason, even successful expansion and conquest cannot result in raising the standard of living in Japan appreciably. Since, in spite of the fact that Japanese conquest claims to bring law, order, peace, and prosperity to the regions taken from China, it would never do to raise these regions above the standard of Japan, the condition of the Chinese peasant in Manchuria must remain even lower than that of the Japanese peasant in Japan. This in turn means that there is no point in taking peasants from Japan to settle them in Manchuria. Such new colonization as is considered necessary in Manchuria must therefore continue to be recruited from famine regions in China. Japanese colonization will be restricted to relatively small and relatively expensive settlements of reservists, placed in Manchuria partly to protect strategic regions and partly in order to make Japanese peasants, who supply most of the conscripts in the Japanese

⁶ Freda Uteley: *Japan's Feet of Clay*, London, 1936, pp. 97, 120, and 233.

⁷ J. F. Normano: Japanese Emigration to Brazil, *Pacific Affairs*, September, 1934, pp. 42-61.

army, think that the reservist organizations and patriotic societies are really able to do something for them. It will be noted that not one of the links in this chain has anything to do with the climate of Manchuria or the racial characteristics of either Chinese or Japanese. All the links are economic and political.

Since, at the same time, Japan must justify its conquest of Manchuria by showing any profits it possibly can, no form of activity can effectively be forbidden to Japanese subjects for fear of arousing complaints and political discontent in Japan. For this reason, so long as individual Japanese are afraid of risking their capital in agricultural enterprises in Manchuria, but are sure they can make profits out of drugs, drugs will continue to be among the most conspicuous phenomena of Japanese imperial expansion.

The real question is: how long can such processes continue without causing more wars between nations and leading to rebellions and revolutions within nations? Both forms of war are inherent in the process, because what governs Asiatic migration today is not relative density of population and availability of new lands, but relative command of capital and ability to put it to use among peoples in regions still not fully exploited by the methods that capital can employ. It may even be misleading to call the problem one of a choice between "peaceful change" and change enforced by war, or the inhibition of change leading to war. For the salient fact is that the one change which really matters is already taking place, though at different rates in different regions—the change from noncapitalistic or precapitalistic economies, or capitalistic economies at a low level of development, to economies in which the only standard is one of the profit on capital investment. Under this standard the migration of men is subordinated to the migration of money, and the chief rivalries are not between races, but between native capital and foreign capital, or between the capital interests of several nations competing for the control of a region which has no native capital. Such rivalries have internecine as well as international consequences, because they demand, in each competing nation, the subjection of the part of the nation that

has no capital to the part that has. This means, in conclusion, that migration, regarded as the easing of economic pressure by shifting populations from one region to another, can neither produce nor maintain stability. Migration, to a very limited extent, eases and defers the problems of the modern world but does not solve them. They can only be solved by creating stability of production, distribution, and consumption within the countries which at present compete with each other either in providing migrants or in financing migration.

THE PRESENT PROSPECT OF CHINESE EMIGRATION

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FLOODS, droughts, and famines have occurred with greater frequency and on a vaster scale in the valleys of the Yellow River and the Yangtse River than in any other parts of China. This might suggest that the oversea emigration of Chinese had come from these regions. Yet the homes of almost all oversea Chinese were originally in provinces outside this area—Fukien and Kwangtung. Transportation facilities may be one of the factors involved, although the extensively navigable Yangtse makes the provinces along its banks far more accessible than the hilly lands of Fukien and Kwangtung. Climate may be another factor, but it must be noted that Kwangtung emigrants have thrived in the by no means tropical regions of the United States and Canada. Important as they may be, climate and transportation facilities can hardly be regarded as the decisive factors influencing Chinese emigration.

When the original five Treaty Ports were opened in China, in the middle of the nineteenth century, Fukien and Kwangtung had already been connected with world markets, through their tea trade with Europe, for a hundred years.² During that period, the joint operation of Chinese trade capital and usury capital had been conditioned by the growth of foreign commerce; and the economic result was a class differentiation far more progressive than that in any other part of China. The intermittent booms and depressions to which the tea trade

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² Chen Han-seng: Economic Results and Diplomatic Consequences of the First Hundred Years of the Tea Trade between China and England, *Quart. Journ. Soc. Sci.* (National University of Peking), March, 1925. (In Chinese.)

became subject, as well as the decline of the handicraft industries caused by the introduction of imported machine-made goods, produced the result that the handicraft worker became poverty stricken, the transportation coolie was unemployed, and the bankrupt peasant was in a state of such dire distress that emigration was the only alternative to continued misery and starvation. Towards the end of the nineteenth century Indian and Ceylon tea began seriously to compete with the Chinese tea trade, and the effect of this was quickly seen in Fukien, where many villages soon became desolate.³ It was then that the South Seas became the Eldorado of the villagers.⁴

While at least one-half and possibly a majority of the Chinese emigrants in southeastern Asia are from Fukien, those in North, Central, and South America are almost exclusively from Kwangtung. This was not on account of any preference for the South Seas on the part of the Fukienese—either for reasons of climate or transportation facilities—but because the Americas were practically closed to Chinese emigrants by the time the Fukienese were leaving China in large numbers. During the last half of the nineteenth century land that had belonged to the Indians and half-slave coolie labor contracted from China formed the basis for the phenomenal economic development of the New World, especially North America. For the thirty-year period from 1845 to 1875 the demand for Chinese coolie labor was so great that the competing foreign emigration agents were willing to take any steps in order to secure the Chinese government's permission to ship the coolies. For some years after 1868 they even paid the Chinese government \$2 for each coolie that they shipped.⁵ As soon, however, as the mines had been opened, the railways constructed, and the truck farming established, the English-speaking Pacific countries began to adopt exclusion policies, and as early as the first decade of the present century Chinese immigration had already become a practically closed question

³ C. T. Gardner: Amoy Emigration to the Straits, *China Review*, Vol. 22, 1897, pp. 621-626.

⁴ The Nan Yang, verbally translated "South Seas," usually means the countries and especially the archipelagos immediately southwest and south of southern China but occasionally is also meant to include all of Australasia.

⁵ Cecil Clement: *The Chinese in British Guiana*, London, 1915, p. 398.

to them.⁶ From then on and up to recent years the British and Dutch colonies in southeastern Asia, besides Siam and the Philippines, were the only places open to considerable numbers of Chinese emigrants.

When, in 1932, one Chinese author summarized the immigration restrictions imposed on Chinese in the United States, Canada, New Zealand, and Australia, based upon a very wide variety of documentary references, he stated that in spite of the one thousand years' duration of Chinese migration abroad—a relatively long period when compared with the period of British oversea expansion—less than 2 per cent of China's population had actually emigrated: a very small figure compared with that from certain European countries.⁷ Of all the Chinese emigrants, 96 per cent are in the Pacific area and 87 per cent live in areas inhabited by colored races, mainly tropical and with no competitive white labor. Barely 1 per cent of the Chinese abroad are living in the United States, Canada, New Zealand, and Australia, and they form only 0.14 per cent of the total population of these countries.

All evidence points to a substantial decrease in the total number of Chinese abroad since 1930. Exact figures cannot be derived from the records of the Commission on Oversea Chinese Affairs of the Chinese government. In 1933 the total remaining number was put at about eight millions.⁸ This figure, however, although the latest official one, must be a slight overestimate on account of its having incorporated for some countries the 1930 census figures, which had in the meantime dropped noticeably in French Indo-China and the Netherlands Indies.⁹ At present, only Siam, British Malaya, and the Netherlands Indies have a Chinese population of over one

⁶ Chester Rowell: Chinese & Japanese Immigrants—A Comparison, *Annals Amer. Acad. Polit. and Soc. Sci.*, Vol. 34, 1909, p. 229: "China is powerless to protect, whether we deal justly or not, and the dwindling remnant of Chinese present few occasions for personal and diplomatic friction. The Chinese problem is easy, as our present policy continues . . . The Chinese problem is approaching its end, unless we reopen it."

⁷ Char Yin-yuke: Legal Restrictions on Chinese in English-Speaking Countries of the Pacific, *Chinese Soc. and Polit. Sci. Rev.*, October, 1932, pp. 472-513; January, 1933, pp. 615-651.

⁸ The Commission on Oversea Chinese Affairs, *Oversea Chinese Monthly*, 1931 and 1934. (In Chinese.)

⁹ Li Shan-huan: Retrospect and Prospect of the Chinese Emigrant in the South Seas, *The Eastern Miscellany*, Vol. 33, 1936, pp. 61-74. (In Chinese.)

million each. Hong Kong has a Chinese population of over 800,000, and the Soviet Union is the only other place where the Chinese population touches 200,000.¹⁰

There is an unmistakable tendency for the numbers of Chinese in Siam to decrease. It is true that there was a 70 per cent increase in their number during the ten-year period from 1920 to 1930. At the end of that period there were two and a half million Chinese in Siam according to the Chinese official figures; although, according to the Siamese census which excludes those Chinese born in Siam, there were only about one-fifth of this number. Since 1930, however, there has been a steady decrease of Chinese immigration in Siam, which is clearly shown by the Siamese official statistics.

INDEX OF CHINESE MIGRATIONAL SURPLUS IN SIAM¹¹
(Excess of Arrivals over Departures)

1930-31 = 100			
<i>Year</i>	<i>Index</i>	<i>Year</i>	<i>Index</i>
1918-19.....	128	1926-27....	133
1919-20....	92	1927-28.....	331
1920-21....	139	1928-29..	111
1921-22... ..	121	1929-30....	82
1922-23... ..	122	1930-31.....	100
1923-24... ..	200	1931-32.....	73
1924-25... ..	199	1932-33.....	55
1925-26... ..	140		

Though no official statistics are available since 1933, the data from the two ports of Hainan and Swatow show that in 1932-1933 the Chinese migrational surplus in Siam was only 656 and in the following year there was an actual deficit of 668.¹²

This rapid decrease in the inflow of Chinese immigrants into Siam has been accompanied by an equally rapid decrease of Chinese remittances from Siam. A joint investigation by the old and new Chinese banks and importing and exporting firms in Swatow revealed the following figures:

¹⁰ It is impossible to estimate either the number of Chinese or the annual influx of Chinese in French Indo-China.

¹¹ *The Statistical Yearbook of the Kingdom of Siam*, No. 9, 1924; No. 16, 1932, Ministry of Finance, Bangkok. Also No. 17, 1933, Ministry of Economic Affairs, Bangkok.

¹² Kingdom of Siam, The China Trade Association, Shanghai, 1936.

AMOUNTS REMITTED FROM BANGKOK TO
SWATOW IN CHINESE DOLLARS

	<i>In Millions</i>
1930.. . . .	40
1931.. . . .	35
1932.	32
1933.	27
1934.. . . .	20
1935.	15

This decline clearly reflects the impoverished status of the Chinese immigrants in Siam, fully 60 per cent of whom originally came from the Swatow region.

Recent investigations show that about 80 per cent of the rice-polishing industry is in the hands of the Chinese, and so are 60 per cent of the Siamese exports and 40 per cent of the imports.¹³ There are no less than 80 large rice mills and more than 800 small ones in Siam that are Chinese-owned and have a total capitalization of 20 million baht.¹⁴ The Chinese millowners as well as the Chinese merchants practise usury both directly and indirectly. More than 70 pawnshops in Bangkok are Chinese-owned, 15 of them having a capital of about 150,000 Siamese baht. It has been estimated that the poorest peasants in Siam, who constitute 70 to 80 per cent of the total population, are indebted to the Chinese usurers to the extent of 148,600,000 baht.¹⁵

Of course the number of Chinese millowners and usurers are relatively few compared with the laborers. In Bangkok there are many Chinese boatmen, ferrymen, ricksha men, rice-mill workers, construction workers, tailors, barbers, butchers, machine-shop workers, coolies, and domestic workers. No less than 76 per cent of the working class in Bangkok is Chinese.¹⁶ Naturally, the employment of such an enormous number of Chinese is to a large extent due to the influence and power of the Chinese millowners and merchants.

¹³ *Eastern Asia Monthly* of the Eastern Asia Economic Research Bureau, Tokyo, Mar., 1937, p. 95. (In Japanese.)

¹⁴ The baht is at present equivalent to 45 cents U. S. currency. Li Shan-huan, *op. cit.*, p. 72.

¹⁵ U. S. Bureau of Foreign and Domestic Commerce: *Quarterly Trade Report; Southeastern Asia*, Sept. 7, 1935, pp. 37-48; *Eastern Asia Monthly*, Mar., 1937, p. 97.

¹⁶ *Eastern Asia Monthly*, Mar., 1937, p. 99. N.B.: Total percentage is misprinted.

However, not only Chinese laborers but even capitalists and merchants are no longer welcome immigrants to Siam. In 1927 a series of restrictions began to come into force, and from then on Chinese born in Siam were compelled to take up Siamese citizenship. In 1931 those unable to pay head tax were refused admission to the country and the head tax at time of admission, which in 1927 had been 6 baht, was raised to 13½ baht. Furthermore, by the law of 1931 a resident's certificate was necessary, which was good for only two years and cost 30 baht; and upon departure another certificate costing 5 baht had to be obtained.¹⁷ The revised regulations of 1933 made Chinese immigration more difficult than ever.¹⁸ At this time the residential permit was good for one year only, and the cost was raised from 30 to 100 baht. Likewise the fee for a permit of departure was raised from 5 to 20 baht; and for the first time a literacy test was introduced, which meant the virtual exclusion of women.

The Chinese already in Siam are now subjected to a variety of regulations purported to restrict their business and education.¹⁹ Every Chinese shop is now required to employ at least one Siamese, and every Chinese-owned mill must have several Siamese employees—"as many as possible." In the meantime, the business tax and income tax of the Chinese have been increased in rate. Since 1934 more than 80 Chinese schools have been closed by the Siamese authorities, and a special set of regulations is now imposed upon such schools. Chinese teachers who have not properly registered and passed certain examinations are not admitted to the Chinese schools, and without the permission of the Minister of Education they cannot even take up residence in the schools.²⁰ Chinese teachers and school trustees are required, upon appointment, to hand in their photographs and finger prints. They are permitted to give Chinese instruction for four hours a week at the most, while they must give twenty-one hours of Siamese instruction. Moreover, the class schedule is set by the au-

¹⁷ *I.L.O. Legislative Series*, Vol. 8, Part 2, 1927; Vol. 12, Part 2, 1931.

¹⁸ Huang Cheng-min: Legal Status of the Chinese in Siam, *The Eastern Miscellany*, Vol. 33, 1936, pp. 31-43. (In Chinese.)

¹⁹ Liang T'un-kao: The Economic Decline of the Overseas Chinese, *The Eastern Miscellany*, Vol. 33, 1936, pp. 41-51. (In Chinese.)

²⁰ Lin Yu: Twin Loyalties in Siam, *Pacific Affairs*, Vol. 9, 1936, pp. 191-200.

thorities, and the classes in Chinese are always put in the middle of the afternoon, when the pupils are mentally the least alert. It is obvious that all these petty and vexing regulations have been designed mainly for the purpose of assimilating Chinese residents as fast as possible and of discouraging their contacts with the home country; thus indirectly they also tend to lessen immigration.

In British Malaya there are at present no restrictions such as exist in Siam with regard to Chinese immigration. "Until 1930 immigration was practically free, and one of the lucrative trades of Singapore was the importation of labourers from China. In that year a quota system was applied to the immigration of adult male labourers from China with the objects of reducing unemployment, . . ." ²¹ The lucrative trade of carrying coolies to Malaya flourished in the last decade of the nineteenth century. In 1897, 50,000 were shipped from Amoy, and only half of that number returned during the same year. ²² As late as 1921 to 1930 the average annual Chinese emigration to Singapore was 241,800. ²³ There was a migrational surplus of 200,000 Chinese per year during the rubber boom of 1923-1930. ²⁴ With a certain fluctuation, the general decrease began in 1930. In 1932, when the quota system of 1000 per month was in force, only 34,000 arrived in Malaya, and 162,000 left to return to China. ²⁵ By January 1, 1935, the Chinese in Malaya (Straits Settlements, Federated Malay States, and Unfederated Malay States) totaled 1,648,815. ²⁶ Owing to the demand for the cheaper Chinese women laborers on rubber plantations, more and more women have been admitted in the past few years. Whereas in 1931 the ratio of Chinese men to women in Malaya was 203 to 100, by 1935 this had become 165 to 100. ²⁷

By far the greatest majority of Chinese immigrants to

²¹ Statistical Department of S. S. and F. M. S., *Malayan Year Book*, 1935, p. 30.

²² C. T. Gardner, *op. cit.*, p. 625.

²³ K. J. Pelzer: *Die Arbeiterwanderungen in Sudostasien*, Hamburg, 1935, p. 113.

²⁴ C. A. Vlieland: *The Population of the Malay Peninsula*, *Geogr. Rev.*, Vol. 24, 1934, p. 70.

²⁵ *Ostasiatische Rundschau*, Hamburg, 1933, p. 372.

²⁶ *Malayan Year Book*, 1935, pp. 36-37.

²⁷ Siao Chi-shan: *Regarding the Conditions of Overseas Chinese*, *Current Events*, Vol. 16, 1937, p. 50. (In Chinese.)

Malaya are of the laboring class. In the period 1929 to 1934, in the years of migrational surplus, Chinese laborers made up as much as 90 per cent of the total, while in the years of deficit they formed as high a percentage as 187.²⁸ Again, the majority of workers were on rubber plantations and in tin mines. Malaya, on the whole, is a single-crop country, "where rubber plays the part played by cotton in the cotton belt of North America, and all the disadvantages of a single crop economy are felt to the full. The prices of rubber and tin are a tune to which Europeans, Indians, and Chinese must all dance, together with the traders who wait on them."²⁹ The general depression in rubber and tin production has naturally given a setback to Chinese immigration to British Malaya; but, as will be seen from the following, even if there is a permanent revival the future prospects are not very good.

The Chinese-owned rubber estates and tin mines are losing ground in the face of the advance of capitalism; in the introduction of new machinery, in rationalization of management, and in total capitalization the Chinese lag further and further behind. The most salient example of Chinese failure in the rubber business is that of Chen Chiao-keng and Company, which at one time employed over 16,000 Chinese, but when it declared its bankruptcy in 1934 the estate had already been reduced by 57 per cent. At the beginning of 1935 the Chinese ownership of rubber estates of 100 acres or more was only 17 per cent of the total. Of even greater significance is the fact that the Chinese are being gradually replaced by Europeans and Indians. In the year 1934-1935, European ownership of estates of over 100 acres increased from 1,394,037 acres to 1,462,557 acres, Indian ownership increased from 63,069 to 103,245, while the Chinese dropped from 356,942 to 346,250.³⁰

A similar decline in the Chinese status is to be found in tin production. The following statistics show that more and more of the output has come from the heavily capitalized modern mines under European management.

²⁸ *Malayan Year Book*, 1935, pp. 42-43.

²⁹ W. J. Hinton: *Government of Pacific Dependencies: British Malaya*, Honolulu, 1929, p. 19.

³⁰ *Malayan Year Book*, 1935, pp. 78 and 80, Tables 1 and 2.

PROPORTION OF TIN PRODUCED IN BRITISH MALAYA BY EUROPEAN
AND CHINESE MINES ³¹

	1913 %	1926 %	1927 %	1928 %
European..	26	44	40.6	49
Chinese..	74	56	59.4	51

In 1928 the tin produced from the Chinese-owned mines still accounted for about half of the total, but a further decline has since been evident. The following are the indices of mining production in the Federated Malay States since 1930.

INDEX NUMBERS OF MINING PRODUCTION IN
THE F. M. STATES ³²

<i>Year</i>	<i>European</i> (1930 = 100)	<i>Chinese</i>
1930	100	100
1931	89	78
1932	46	41
1933	45	35
1934	61	53

During the five-year period 1930-1934, while the number of mining laborers as a whole was reduced by 33 per cent, that of Chinese mining laborers was reduced by 37 per cent. Whereas in 1930, 87 per cent of the total of laborers employed was Chinese, by 1934 this percentage had dropped to 82. This shows that the Chinese mining laborers have been decreasing both in absolute numbers and in proportion to other nationalities.

Most of the Chinese in Malaya who are not engaged in tin or rubber production do coolie work, especially in Singapore. A considerable part of their earnings goes to the buying of opium, the habit of smoking having been formed as an antidote to the excessive fatigue caused by their work. "There is a direct connection between the laboriousness and tediousness of labour and the smoking of opium." Professor Hinton made this remark because he observed that among the hard-

³¹ Report on the Administration of the Mines Department and on the Mining Industries for the Year 1928 (Supplement to F.M.S. Government Gazette, April 26, 1929), p. 18.

³² The index numbers as well as the percentages are derived from the *Malayan Year Book*, 1935, p. 74, Table 3.

est working coolies, coal coolies, some 60 per cent smoke opium to make their intense fatigue tolerable, but that among the cargo coolies and ricksha men, whose labor is much easier, not more than 40 per cent smoke opium.³³ In short, the general condition of labor in British Malaya is not conducive to the improvement in their condition that immigrants seek.

If Chinese migration to Malaya is decreasing, this is even more the case as regards migration to the Netherlands Indies. According to the Dutch colonial census, between 1900 and 1930 the yearly average of Chinese emigration to the Netherlands Indies was more than 28,000; but, while in 1921 it was 43,000, in 1928 it was 2,000 less. About one third of the immigrants stay in Java, and the rest are engaged on the tobacco plantations of East Sumatra, in small peasant farming in West Borneo, and in the mines of Billiton, Banka, and East Borneo. The Chinese laborers in East Sumatra numbered 27 thousand in 1930 but dropped to less than half that number in 1935. Chinese immigration in West Borneo was as high as 6414 in 1913 but dropped to some three per cent of this number during the years 1931-1934.³⁴ The total number of free and contract coolies in the years 1930-1934 in Billiton, Banka, and East Borneo showed a steady decrease from 40,097 to 8037.³⁵ The total number of Chinese admitted to the Netherlands Indies, including Java, dropped from 32,181 in 1930 to 7,541 in 1934, and in these four years there was an increase in the percentage of nonlaborers admitted. Because of the Dutch policy of admitting women, children, and persons of no occupation, there was a steady rise in the percentage of nonlaborers in the total number of Chinese admitted. From 1930 to 1934 this percentage increased from 34 to 57, to 59, and finally to 61.³⁶ Since the total number of Chinese admitted since 1930 has sharply decreased, any increase over the census of that year, which gives the Chinese in the Netherlands Indies as 1¼ million, cannot

³³ W. J. Hinton, *op. cit.*, p. 17.

³⁴ W. J. Cator: *The Economic Position of the Chinese in the Netherlands Indies*, Oxford, 1936, pp. 159 and 229.

³⁵ Compiled from *Indische Verslagen*, Batavia, 1930 to 1935.

³⁶ W. J. Cator, *op. cit.*, p. 44.

be from a migrational surplus but must be from Chinese born on the islands.

According to the 1930 census, about 11 per cent of the Chinese in the Netherlands Indies were engaged in agriculture and gardening. Just under 18 per cent were engaged in large estate production, mining, and petroleum industries; 20 per cent were in other industrial pursuits, but as many as 37 per cent were merchants. Just as in Eastern Siberia to the north and in French Indo-China to the south, the Chinese commercial penetration in the Netherlands Indies has not been confined merely to the retail trade but is closely intertwined with the Chinese type of usury.³⁷ The depression in recent years has delivered a serious blow to the usurious Chinese traders in the islands. Many articles of daily use, such as petroleum and matches, have fallen out of use in numerous villages; and textile consumption has also shrunk. Chinese shops here and there have been forced into liquidation owing to the phenomenal business slump and bad debts.³⁸

As the Chinese economy has not advanced as far as the purely capitalistic stage, it is obvious that the oversea Chinese merchants must suffer from the shackles of the old Chinese economic order; and, owing to their small capitalization and lack of organizational experience on an international scale, they are doomed to failure in the face of the more highly organized trading interests of other nationalities.³⁹ For this reason the Chinese traders—as in the Philippines and indeed in Japan itself—are rapidly yielding ground to Japanese competition. In Java, as well as in other parts of the Dutch archipelago, “the advance work of the Japanese storekeeper continues in the interior, where it is still spreading to all sorts of out-of-the-way places. These small shops now often serve as feeders to the big firms, acting as their agents and middlemen. Against this well organized trade system the old fash-

³⁷ E. D. van Walree: *Economic Relations of the Netherlands Indies with other Far Eastern Countries*, Amsterdam, 1936, p. 14; W. K. Arsenjew: *In der Wildnis Ostibiriens*, Berlin, 1924, Vol. 1, p. 154; E. Denneiry: *Foules d'Asie*, Paris, 1930, p. 139: “Sans produire, le Chinois domine la production. Rarement agriculture il contrôle l'agriculture.”

³⁸ Van der Kolff: *The Historical Development of the Labour Relationships in a Remote Corner of Java*, Amsterdam, 1936, pp. 43-44.

³⁹ M. G. Pernitzsch: *Die Chinesen in Niederländisch-Indien*, *Mitt. des Seminars für Orientalische Sprachen zu Berlin*, Jag. 37, 1934, pp. 41-42.

ioned Chinese merchants from Canton stood no chance." "The Cantonese merchants, being no longer required as middlemen, found their position soon on the wane, their business shrivelled up; and in so far as they did not anticipate the change, they not only lost their chances but their capital as well."⁴⁰ In addition to the Japanese, the Chinese have to face the growing competition of the Javanese; for "in Java there is now a movement on foot to interest the younger generation in the retail trade, and thereby prepare the way for the future independence from middlemen of other nationality."⁴¹

In the mining industry the Javanese are already more and more replacing Chinese labor. The Javanese contract laborers in East Sumatra increased from 34,000 in 1906 to 234,500 in 1930; and in the latter year the Chinese workers formed only 35 per cent of the total in East Sumatra, only 28.5 per cent in Banka, and only 22.2 per cent in Billiton.⁴² Within the last three months of 1936, 4132 more adult laborers entered East Sumatra from Java than were repatriated to Java.⁴³ The Chinese who were originally pioneers in the Dutch colonial mines are now losing their importance as a source of labor. In recent years it has, rather surprisingly, been "discovered" that the Javanese and not the Chinese are the cheapest laborers and the easiest to manage. It is allegedly for this reason that it has been possible to reduce the average labor costs of mining. In the brief period 1929-1933 the total mining labor cost, including wages, premiums, food, lodging, medical attendance, recruitment, and repatriation, showed a drop of 25 per cent. Of even more significance was the drop in costs of medical

⁴⁰ E. D. van Walree, *op. cit.*, p. 21.

W. J. Cator, *op. cit.*, p. 76. Japanese commercial penetration means the handling of the wholesale, intermediate, and retail trade as well as transport and insurance, not only dealing with commodities of Japanese origin but also to a large extent from other countries. But, whereas in 1931 only 16 per cent of the value of Japanese imports to the Netherlands Indies were factually Japanese goods, in 1934 this percentage rose to 32. For information regarding Japanese and Chinese competition in the Philippines, see J. B. Richards, "Japanese Competition in Philippine Import Trade," U. S. Bureau of Foreign and Domestic Commerce, Division of Regional Information, Special Circular No. 349, November 30, 1935. By the end of 1935, a third of the retail trade of the Philippine Islands was estimated to be in Japanese hands, as compared with a fifth in 1932.

⁴¹ E. D. van Walree, *op. cit.*, p. 14.

⁴² K. J. Pelzer, *op. cit.*, pp. 105-106.

⁴³ U. S. Bureau of Foreign and Domestic Commerce: *Quarterly Trade Report: Southeastern Asia*, Jan. 5, 1937, p. 24.

care by 32 per cent, food by 47 per cent, and lodging by 88 per cent.⁴⁴

The Chinese coolies on the tobacco plantations in Deli have also had their wages reduced. The Annual Reports of the Deli Planters' Association reveal a drop of the average annual gross wage payment as from 359 guilders per person in 1930 to 341 guilders in 1932; while the annual average saving of a coolie dropped from 89 to 62 guilders in the same period. The only place in the Netherlands Indies where the Chinese are working quite independently of Western capital or native labor is in West Borneo. Here about 79 per cent of the Chinese live in the country and not in the towns, in pursuance of horticulture and peasant farming. These Chinese agriculturists fare no better, however, than the coolies elsewhere; and their sinking economic status can be readily gauged from the general trade statistics of that region, which show a steady decrease in exports of nearly 75 per cent from 1928 to 1934.⁴⁵ It is no wonder, then, that the number of Chinese immigrants in West Borneo is rapidly decreasing. In any case, the Chinese in the Dutch colony are forbidden to own land. The few exceptions in the vicinity of Batavia are those of land acquired by Chinese as long as two centuries ago.⁴⁶

In recent years progressive steps have been taken by the authorities to restrict Chinese immigration, even though "no racial criterion has been adopted in connection with this policy."⁴⁷ Since 1932 the maximum number of foreigners to be admitted has been based on a quota system; 12,000 has been fixed as the total maximum, which is subdivided into fifteen groups, including the Chinese, with a maximum of 800 per group. The fee required for an immigration permit was raised from 25 guilders to 50 guilders in 1922 and again raised to 100 guilders in 1924; since 1930 it has gone up to 150 guilders. "The companies who import Chinese free coolies from China will have to pay this heavy fee for them. This will preclude in future the use of large numbers of immigrants

⁴⁴ W. J. Cator, *op. cit.* Percentages derived from the table on p. 208. .

⁴⁵ *Ibid.*, pp. 171-172.

⁴⁶ E. D. van Walree, *op. cit.*, p. 15.

⁴⁷ W. J. Cator, *op. cit.*, p. 37 to 38.

in cases where Native labour is available.”⁴⁸ Simultaneously, the Dutch colonial government is restricting outside capital investment. “Nothing but sheer necessity has forced it to adopt a defensive attitude, and this is likely to continue until saner economic ideas about international trade will reassert themselves and find practical application again.”⁴⁹

The general diminishing tendency of Chinese emigration overseas can be seen elsewhere than in the Netherlands Indies, British Malaya, and Siam, though these are the three most important areas in this respect. This diminishing tendency is reflected in the decreasing Chinese remittances from overseas. Morse estimated the total of these remittances to be at least 73,000,000 taels annually in the first decade of this century.⁵⁰ This converted into dollars would have amounted to about 100 million Chinese dollars. The total remittance of 1931 was about 185 million dollars, but that was an abnormal increase, chiefly due to world depression and the favorable exchange rate, which, as a combined factor, induced the oversea Chinese to remit as much as possible of their available funds. Since then, however, there has been an enormous decrease. In the home district of Dr. Sun Yat-sen, the district of Chung-shan, near Hong Kong, before 1931 the annual remittance from overseas was more than 30 million Chinese dollars, and even in that year there was still a total remittance of a little over 20 million; but two years later it dropped to barely two million. In a near-by district, Tai-shan, which has 300,000 potential remitters from overseas, 35 per cent of whom are in the Nan Yang, the average annual remittance between 1920 and 1930 was about 30 million, but in 1934 it was reduced to a little over 3 million. Instead of sending back money, the oversea Chinese are now returning in large numbers. Many of those who have returned to Tai-shan are said to have joined the local bandits. In the northern part of the neighboring district, Chu-chi, more than 3000 bandits are still active in the Ku-tau mountains, and it is said that no less than 10 per cent of them are men returned from overseas. In the vil-

⁴⁸ *Ibid.*, p. 232.

⁴⁹ E. D. van Walree, *op. cit.*, p. 44.

⁵⁰ H. B. Morse: *The Trade and Administration of the Chinese Empire*, Shanghai, 1908, p. 301.

lage of Nien-hu, near the port of Swatow, out of a population of 5000, more than 800 male adults had gone to the "South Seas," and there was a time when the annual remittance to this village totalled more than 200,000 dollars. In 1933 that sum was reduced to 40,000 dollars, and in the next year more than 200 of the villagers returned from overseas.

That there has been a considerable decline in the volume of remittances received from overseas in Kwangtung and Fukien appears not only from published reports, but was also told the author by Mr. Bruno Lasker, who studied the situation on the spot in the winter of 1934-1935. For instance, an outstanding authority in Amoy, on the basis of local bank statements for previous years, believed that no less than three out of every five families in the vicinity of that city depended for their livelihood in part on remittances from overseas. However, closer inquiry on the part of the investigator revealed that this proportion had greatly decreased, and this for two reasons: first, thousands of emigrants already had returned to swell the ranks of unemployed and underemployed; second, because capital seemed insecure in the industrial and commercial enterprises of both South China and of their oversea communities, the more successful of the emigrants at that time tended to leave their savings uninvested in the bank vaults of Hong Kong and Shanghai.

Since 1931, with the loss of Manchuria to China, Chinese migration to the northeast must be regarded in every way as emigration. Owing to the Japanese conquest and subsequent policy, the prospect for Chinese emigrants is none too bright. The Chinese coolies from Hopei, Shantung, and Honan have repeatedly been refused admittance by the Japanese-controlled police. Only those from the eastern part of Hopei, where there is a pronounced Japanese protectorate, can gain admittance, and they have to pay one dollar after having been granted an immigration permit.⁵¹ The years during which the annual migrational surplus rose to half a million and more are most unlikely to be repeated. Indeed, since 1932, more than 200,000 Chinese have flocked from Manchuria to the Tientsin-Peiping area. While Marshal Chang Hsueh-liang

⁵¹ *Shun Pao* (a Chinese daily newspaper), Shanghai, February 25, 1937.

was in Sian, no less than 3000 army officers originally from Manchuria had their families moved to the northwest—a slight indication of what might become a larger movement.

In spite of the enormous magnitude of annual migration to the northeast prior to 1931, the economic system thus created has not in any way been a desirable one. Regardless of whether the Chinese colonists are superior to the Russians or not, and regardless of the reason for this, the fact remains that the Chinese peasants who could not hold on to their old home places have become migrants without option. This “throws colonisation into the hands and under the control of land magnates and exploiting groups.”⁵² The Chinese peasants who came into Manchuria did not receive anything like the grant of free homesteads; they were from the beginning tenants and hired laborers dependent on their landlords and farm managers. The peasant scarcely earned enough to live on, but the landlord forced payments. Although in the Chinese Amur region there are still at least 10,000,000 shan (1 shan is about 1½ acres) of cultivable land, the thousands and tens of thousands of Chinese peasants who have settled there have not brought about a proportionate increase in area under cultivation.⁵³

Whether within national boundaries or on an international scale, the ultimate and decisive factor in migration is a matter of capital and its operation. Modern history offers abundant data for the support of this thesis, and what was said over a century ago with reference to Chinese emigration still holds good today. The Chinese “compelled by oppression or

⁵² V. K. Arsenjew: *Russen und Chinesen in Ostsibirien*, Berlin, 1926, p. 60. The Russians are much slower in adaptation to farming than the Chinese, according to this author.

E. E. Yashnov: *Chinese Agriculture in Northern Manchuria*, Harbin, 1926 (in Russian), Chapter 4. The Russians are faster in colonization because of their natural economy, according to this author. Yashnov thinks that the commercial character of Chinese agriculture “explains, together with some other conditions, the slow character of the distribution of population in China. That is why, regardless of the fact that China has been over-populated for nearly two thousand years, there was side by side, in the middle of the 17th century, Manchuria, and Mongolia completely uninhabited. That is why the Russian peasant covered the large spaces of Siberia and reached the shores of the Amur and the sea of Japan much sooner than the Chinese.”

Owen Lattimore: *Chinese Colonization in Manchuria*, *Geogr. Rev.*, Vol. 22, 1932, p. 195.

⁵³ Chen Han-seng: *Notes on Migration of Nan Min to the Northeast*, Shanghai, 1931, p. 31.

pinching poverty to emigrate, find too few friends in their wanderings. Cast off also entirely from any protection by their own government, they are left at the mercy of any foreign oppressors where they may reside, with the prospect of being plundered again on their return home, by their countrymen."⁵⁴

The problem of migration, together with the larger and all-embracing problem of population, still claims the careful and analytical study of social scientists. There are those who seem to fear the natural growth of population among the Oriental races and see in it only a threat of war.⁵⁵ Others would advocate more or less free migration "for the sake of the continuity of civilization". Professor Corrado Gini evidently belongs to the latter group. He would sponsor "a timely infiltration into the dominating populations of the present of elements from the lower classes of the populations of the future, and, *vice versa*, an infiltration into the populations of the future of elements from the upper classes of the dominating populations of the present, as the best means of preventing a hiatus" (in the continuity).⁵⁶ Such a view obviously portrays wishful thinking rather than the revelation of a real understanding of the problem.

This short paper is written in the hope that it may illustrate some of the more neglected factors that influence migration movements. Much has been said about the influence on such movements of climate, transportation facilities, and the relative wealth or sparsity of natural resources. The experience of China seems to indicate the importance of capital and its operation as a primary factor in determining the direction, the volume, and the character of emigration.⁵⁷ And although this subject is in need of more exhaustive studies than have yet been attempted, it is clear that one must distinguish between the respective influences of the several forms of capital,

⁵⁴ *Chinese Repository*, Vol. 2, 1833, p. 180.

⁵⁵ Gaston Bouthoul: *La Population dans le monde*, Paris, 1935, p. 81. Bouthoul's contention is: Have you a superabundant population? The fault is yours. Why do you not limit it to the point where your land can contain it?

⁵⁶ Corrado Gini: Problems of the International Distribution of Population and Raw Materials, *Annals Amer. Acad. Polit. and Soc. Sci.*, Vol. 189, 1937, p. 211.

⁵⁷ Freda Utey: Population and Conquest, *Pacific Affairs*, Vol. 10, 1937, pp. 16-29; Chen Han-seng: Conquest and Population, *ibid.*, Vol. 10, 1937. [To be published in the June number.] Both articles discuss the population problem of Japan in the light of capital and its operation.

as in trade, usury, industrial investment, and banking transactions. Moreover, the operations of capital not only affect immigration directly but also determine the policies expressed in those legal provisions and political regulations that make up the machinery of control.

JAPANESE MIGRATION AND COLONIZATION

By Karl J. Pelzer

OF ALL the problems that have confronted Japan in recent years none has caused more discussion than that of over-population. This problem has been one of the major themes of conferences and publications dealing with the Japanese Empire.

Japan is not the only overcrowded country in southern and eastern Asia, where half or even more than half of the total population of the world is concentrated. China, Java, and India must also be mentioned as south and east Asiatic countries with extremely high densities. But these three countries have not yet demanded new outlets for their crowded millions as Japan has done in the last decades.

Japan's Population Problem

In 1932 Japan proper had a total population of 66,296,000 living on an area of 146,000 square miles, a density of 453 persons to the square mile. These figures in themselves do not bring out the serious situation in which the Japanese Empire finds itself. Environmental bonds allow the Japanese farmer the use of only a small part of the total area. A mountainous forest-covered countryside makes up 52.1 per cent of Japan proper. Only 20 per cent of the area can be cultivated, and at present something like 16 per cent is actually used for agricultural purposes.¹ This is a strikingly small amount in comparison to 22.3 per cent in Great Britain, 43.7 per cent in Germany, 39.4 per cent in France, and 41.4 per cent in Italy. In 1932 Japan proper had not less than 2878 persons to one square mile of crop area, and in 1936, 2970. That

¹ Economic Handbook of the Pacific Area, edited by Frederick V. Field, Garden City, N. Y., 1934, p. 65.

is a density unique in the whole world. Japan has 1190 more people to the square mile of crop area than Belgium, 590 more than the Netherlands, and 670 more than the United Kingdom.²

A few more facts must be added. In spite of the most astonishing development of commerce and industry, agriculture is still the leading occupation among the Japanese. In 1930 nearly 48 per cent of the population was engaged in agriculture, 72 per cent of all agriculturists derived their entire income from agriculture, and 28 per cent a subsidiary income. In 1930 the nation had invested 34,700,000 yen in agriculture, 13,000,000 yen in commerce, and 10,000,000 yen in manufacturing industries.³ Most of the Japanese farms are extremely small; 34.2 per cent of all families till less than 1.225 acres, and 34.3 per cent till from 1.225 to 2.45 acres. More than two-thirds of the entire area under cultivation is thus held by farmers cultivating less than 2.45 acres. Farms of 2.45 to 4.90 acres constitute only 22.2 per cent, and those of more than 4.90 acres only 9.4 per cent of the total agricultural land.⁴ Family labor dominates on the farms; large-scale farming involving machinery is very limited. Only 31 per cent of the farmers are proprietors of the land they cultivate, whereas 42 per cent are tenants and proprietors, and 27 per cent are tenants. In recent years there has been much unrest among the agricultural population, caused by low prices of farm products, high taxation, high rents, and the increasing difficulty for the surplus agricultural labor to find employment in the industrial cities, as was possible for a long time. The result has been an increase in prices for agricultural land and a further decrease in the size of the farms.

Agricultural and industrial development have made it possible for Japan to maintain at an improved standard of living a population that has increased rapidly since the second half of the last century. But natural resources are limited, and the

² Grover Clark: *A Place in the Sun*, New York, 1936, p. 107.

³ S. Mayeda: *Our Stricken Agriculture*, *Contemporary Japan*, Vol. 1, 1932, p. 266.

⁴ Mitsubishi Economic Research Bureau, Tokyo: *Japanese Trade and Industry, Present and Future*, London, 1936, Chapter XI, pp. 149ff.

country seems now to have reached its maximum population. It is not so much the problem of food supply that confronts Japan today. "Japan may be able to support 100,000,000 as far as food alone is concerned if the use of rice, potatoes, and fish is properly combined."⁵ The problem lies with the agricultural and unskilled laborers who are forced to leave the rural areas and the farms of their parents because there is no work for them to do. "Japan will have to find work for something in the neighborhood of a quarter of a million new workers coming upon the labor market in each of the next years. Nothing can alter that. They are already born."⁶ Birth control is not the solution for this part of the population problem. Japan has to find in the near future ways to absorb these additional laborers.

Many solutions to the problem have been suggested:

1. Increase of industrialization

This depends upon an increasing access to foreign markets in order to obtain raw materials and to sell manufactured goods.

2. Birth control

T. Uyeda has presented information indicating that the Japanese population will become stationary very soon.⁷ But, as we mentioned, birth control cannot solve the problem in so far as it concerns those already born.

3. Reclamation of land

There is an estimate that 6,000,000 acres could be reclaimed, including land now devoted to boundary ridges and pathways that could be saved by the consolidation of small fields. In most instances the cost of reclamation would be so high that utilization would be an unprofitable business at existing price levels.

4. Emigration

This solution seems very simple, but so far it has not given the results expected.

⁵ Shiroshi Nasu: *The Problem of Population and Food Supply in Japan, Problems of the Pacific*, 1927, Chicago, 1928, p. 359.

⁶ Statement of C. L. Alsberg.

⁷ Teijiro Uyeda: *Future of the Japanese Population*, Tokyo, 1933.

The last suggestion, "emigration," will be the special theme in the following discussion.

Forces Behind European Migration

What major forces were behind the European migration that peopled such wide areas of the world in not quite four and one-half centuries? Some of them were:

1. Religious and political persecution
2. Spirit of adventure and the hope of acquiring wealth
3. Deportation of convicts and other undesirable elements of the population
4. Desire for cheap land among the landless peasantry
5. Possibility of obtaining employment in industry and hence a higher standard of living.

During past centuries the religious and political persecutions in connection with economic and civil limitations have forced large and enterprising groups to look for new lands, where they could determine their own future and way of living. Practically every important European country has had this type of emigration. The deportation of convicts and paupers formed a substantial source for peopling colonies in the early days. The mass migrations of the nineteenth century and of the beginning of the twentieth were motivated in the main by desire for higher living standards based on land acquisition or industrial employment.

History of Japanese Migration

Japan, on the other hand, did not allow any form of migration from 1638 to 1868. At a time when European countries were sending out a great stream of people into empty lands overseas, not so much because of overpopulation as for reasons already mentioned, the Japanese government did everything to keep its subjects on the islands. Furthermore, there has never been any religious or political persecution in Japan that could have driven a part of the population overseas. Only relatively recently have Japanese authorities begun to realize that the growth of population since the end of the feudal system has overburdened the country and to

attempt to find ways of settling at least a part of the population either in Japanese colonies or in countries where Japanese immigrants were accepted. In the history of Japanese migration we have therefore to distinguish between internal and external migration.

As soon as Japan was opened, foreign entrepreneurs tried to induce unskilled Japanese labor to come under contract and work for them.⁸ The plantation owners of Hawaii were especially anxious to get Japanese labor. By 1894 Hawaii had already received 30,000 Japanese. The annexation of Hawaii by the United States in 1898 ended the immigration of contract laborers into the islands. The first Japanese laborers landed in the United States in 1884. They were needed to replace the forbidden Chinese in agriculture and in railroad construction. The United States and Canada, with their high wages and good markets for agricultural products and fish, in a few years became the center of attraction for the Japanese, after letters and money remittances of the first migrants had told relatives and friends of their experiences and successes.

As their numbers grew, public opinion turned against them. By 1907 a Gentlemen's Agreement curbed free immigration of Japanese into Hawaii and the United States, and the laws of 1924 stopped the migration entirely. When North American countries started to limit Japanese migration, it turned towards South America. The first contract laborers went to Peru, and by 1912 the migration to Brazil was under way. It is not surprising that in the first years of the migration to South America the number of migrants was very small. The conditions in South America were very different from those in the United States with which the Japanese had become acquainted. Pioneer groups tried out several South American countries, but soon Brazil took the lead among the lands that attracted Japanese in increasing numbers, until within the last two years the Brazilian government decided to check this movement.

Australia adopted the White Australia Policy so early that

⁸ This migration of contract labor became established after the abolition of slavery in the English colonies and has not yet entirely disappeared.

only a few Japanese secured the right to remain there without any time limitation.

"The feebleness of Japanese emigration as a source of relief for the mounting population"⁹ is caused by forces that are largely beyond control of the Japanese government and people. The argument is often set forth that Japan cannot

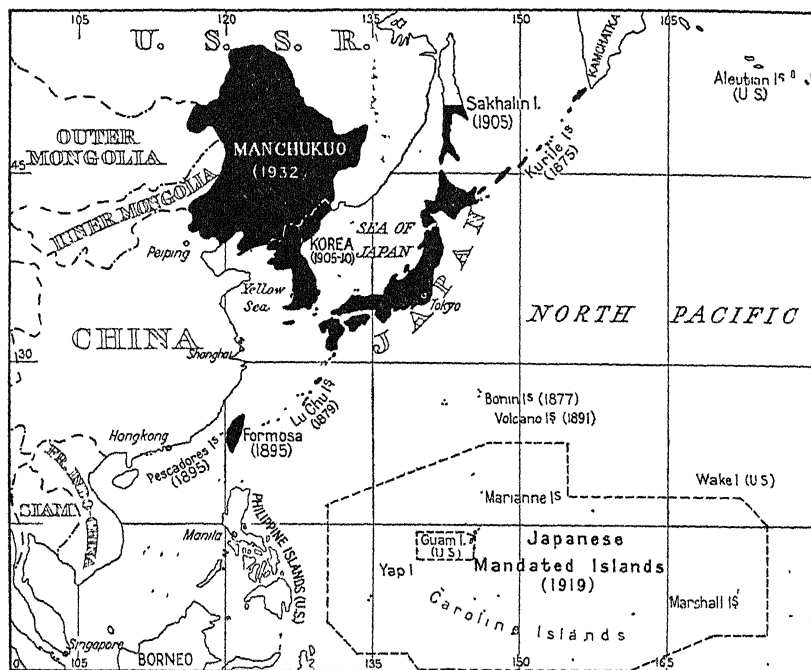


FIG. 1. Map showing the steps in Japanese expansion. (Courtesy of *Foreign Affairs*.)

complain about the exclusion of her subjects, because they have the possibility of migrating from Japan proper to the colonies; in other words, the argument points out the possibility of internal redistribution of the population.

Since the beginning of the Meiji Era Japan has enlarged herself through expansion. She started out in 1875 with the Kurile Islands, followed by the Ryukyu Islands, Formosa, and the Pescadores Islands, Korea, Sakhalin, the South Sea Mandate, and, finally, Manchuria (Fig. 1). Japanese expansion

⁹ Isaiah Bowman: *The New World, Problems in Political Geography*, Yonkers-on-Hudson, 1928, p. 581.

is doublefaced: there is a continental expansion toward the mainland, and a maritime expansion into the Pacific, north and south of Japan proper. Japan emerged rather late as an empire builder; so that aside from the small island groups

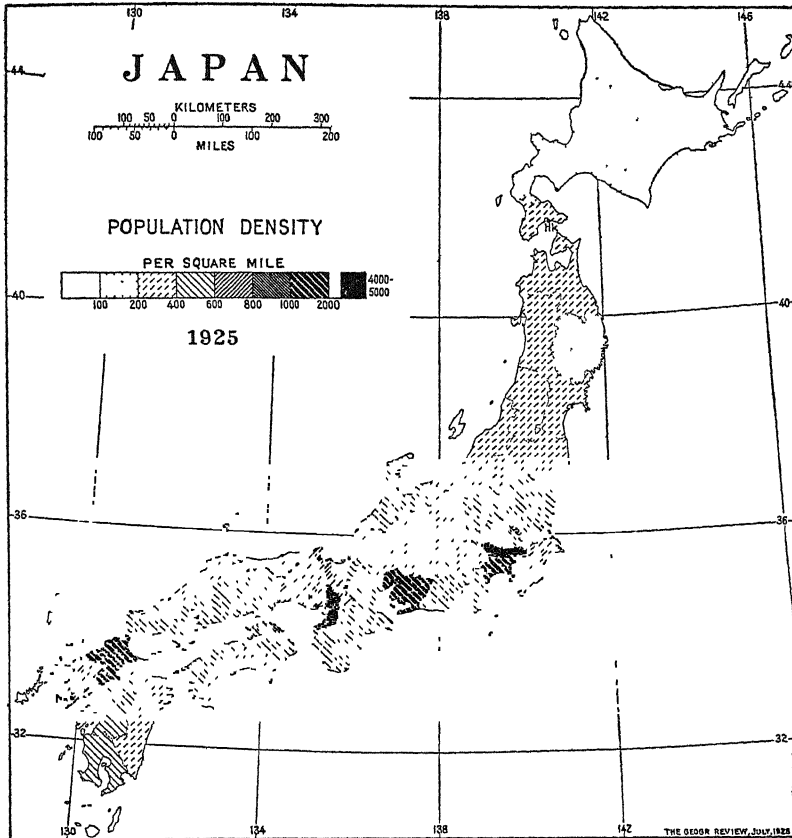


FIG. 2. Population density of Japan by prefectures, 1925. Scale approximately 1:14,500,000. The largest cities are indicated by initial letters: O, Osaka; T, Tokyo; N, Nagoya; K, Kyoto; Kb, Kobe; Y, Yokohama; H, Hiroshima; Nk, Nagasaki; Hk, Hakodate. (Courtesy of *The Geographical Review*.)

she was only able to break off peripheral parts of the weak Chinese Empire: Korea, Formosa, and Manchuria. She found on the islands, with the exception of Formosa, a thin population that offered no resistance physically, culturally, or economically, and it was not difficult to place among them a few hundred thousand Japanese as settlers and fishermen.

What is the relation between population distribution in Japan and climate? (Compare Figures 2 and 3.) In Japan proper "the central and southern climatic zones . . . are the seats of the densest populations and most of the largest cities. The southern part of the central zone is distinguished as a two-crop region, rice in summer and wheat in winter. The southern zone is semitropical, and three crops a year

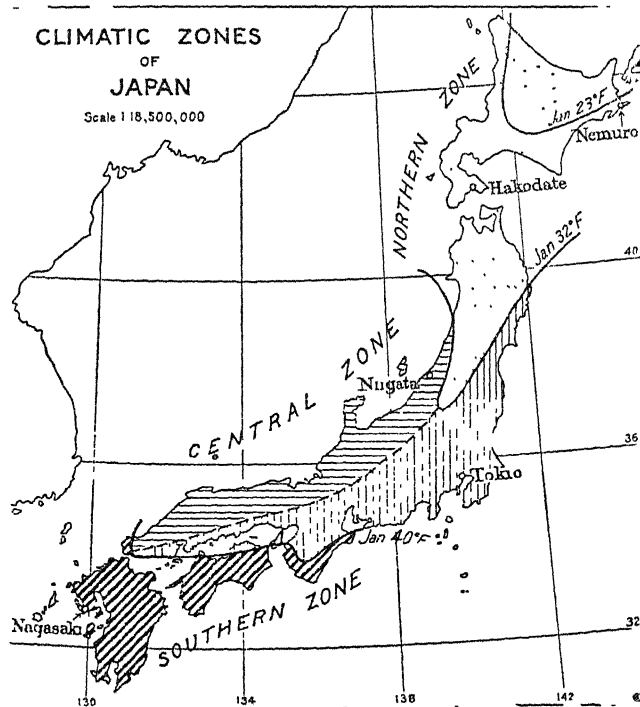


FIG. 3. Climatic zones of Japan. (Courtesy of *The Geographical Review*.)

can be raised. In the northern zone, where colonization is most active, the climate is marked by extreme temperatures. The average winter temperature is below freezing. The summer temperatures range between 60° and 70° F. There is also a deficiency of rainfall; for the annual average is here less than 20 inches in contrast to a constantly increasing precipitation towards the south. The eastern side of the central zone is naturally the best favored, with a rainy summer season and less cloudiness and fog than the western side

of the main island."¹⁰ The entire southern zone, with the exception of the more mountainous eastern part of central Kyushu, is very densely populated. The Japanese consider Kyushu as the home of their ancestors, whence they migrated by water along the coast of the Inland Sea and settled in southern Hondo and in the north and west of Shikoku. Shikoku, with its high densities in the west and north, belongs to the southern climatic zone. In the central zone the population is concentrated especially in two areas, the Kinki district of the west with Kyoto and Nara in the center, and in the Kwanto district in the east, mainly in the plains of Tokyo and Nagaya. Northward, towards the northern climatic zone, the population density decreases, and no prefectures to the north of 37° N. exceed the mean density of Japan proper.¹¹

From the south, probably by way of the Ryukyu Islands, came the Yamato people, who brought with them Malay blood and old southern cultural elements; from the continent, from China and Korea, came other ancestors of the modern Japanese. The southern oceanic element, however, dominates over the continental strain.¹² This has an effect upon every phase of Japanese life, and has to be taken into account by the leaders and statesmen of the Empire. Only very slowly, under pressure, and with the help of the government has the Japanese farmer found his way into north Hondo, and still less willingly into Hokkaido. A continental climate with extreme temperatures or a winter with a long and heavy snowfall is the greatest obstacle for Japanese farm colonization. The house and whole mode of life are bound to a warm, sub-tropical monsoon type of climate.

The fact that Japanese fishermen are active in northern waters has no bearing upon the relation of the climatic factor to the migration of Japanese farmers who for psychological reasons are slow in adaptation. The Japanese fishing industry

¹⁰ *Ibid.*, pp. 580-581.

¹¹ Naomasa Yamasaki: A Note on the Geographical Distribution of Population, Birth- and Death-Rates of Japan, *Problems of the Pacific*, 1927, Chicago, 1928, p. 361.

¹² The racial ratios are approximately: Malayan-Mongolian, 60%; Chinese-Mongolian-Tungusian, 30%; Ainu-Palaëoasiatic, 10%. See Gustav Fochler-Hauke: *Der Ferne Osten: Macht- und Wirtschaftskampf in Ostasien*, Leipzig, 1936, p. 23.

of Kamchatka and the coast between Vladivostok and Nikolaevsk is entirely seasonal. The fishermen come in the spring and leave in the fall, so that they are not exposed to the severe winters. No change in diet is necessary because they bring with them the food to which they are accustomed.

Northern Migration

To Hokkaido

The colonization of Hokkaido by a people in which the tropical Malayan element dominates is a great accomplishment. Only the leadership of agricultural experts and the advice given by agricultural experiment stations, together with new varieties of his main crop, have made the Japanese farmer successful. The population of Hokkaido increased from 105,108 in 1869 to 2,812,342 in 1930, largely by immigration.¹³ Virtually all the agricultural land of value has been taken, and the filling of the remaining open spaces is a slow process. Hokkaido can never carry densities as great as southern Japan, because the farmer can raise only one crop a year on a field and needs therefore a larger farm. The Japanese have had notable success in producing new varieties of rice which mature in 90 days. But the area suitable to rice fields is limited; so that the farmer has to adapt himself to diversified farming.¹⁴ It is characteristic that the earliest Japanese communities of Hokkaido were formed by fishermen, a large part of whom were migrants. The same condition exists today in Karafuto.

To Karafuto

The climate of Karafuto is less suitable to Japanese agriculturists than that of Hokkaido, so that they have to change to a still larger extent their economy and mode of life. In 1930 the census reported only 295,000 people in Karafuto, most of them gainfully employed in fishing, mining, and forest

¹³ D. H. Davis: Present Status of Settlement of Hokkaido, *Geogr. Rev.*, Vol. 24, 1934, p. 386.

¹⁴ A. Scheinpflug: Die japanische Kolonisation in Hokkaido, *Mitt. d. Ges. f. Erdkunde z. Leipzig*, Bd. 53, 1933-34, Leipzig, 1935, pp. 5-132.

industries. This indicates that the country does not possess enough attraction for the warmth-loving Japanese farmer of the congested areas of southern Hondo or Kyushu.

To Korea

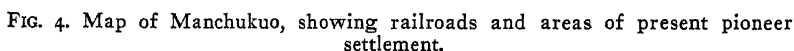
Korea became a colony of Japan in 1910. Japanese political leaders had great hopes of finding there new outlets for their farmers. They did not succeed in forming large Japanese agricultural settlements because Korea was already so oversaturated that there was no room for new settlers unless they drove the Koreans out of their own country. The less populated northeast of Korea has a rugged topography. In 1930 Korea had a population of 21,058,000, a density of 247 persons to the square mile of total area and of 1253 persons to the square mile of crop area. It is estimated that only 25.8 per cent of the country is cultivable. So far, 19.65 per cent has been cultivated, and we know that the cultivation of the rest is almost impracticable owing to the great cost; so that there is no hope for any considerable extension of the crop area.¹⁵ In spite of the density of population in Korea, influential imperialistic circles have brought agricultural colonization under way. They forced the Korean government to transfer all the crown land to the Japanese Department of Finance, which in turn gave to two companies, the Toyo Takushoku Kaisha, or Oriental Development Company, and the Funi Industrial Company, the right to carry out the colonization. The Oriental Development Company bought land in addition to that contributed by the government in order to widen the basis for agricultural colonization. The success was very limited.¹⁶ Japanese settlers frequently sold their land to Korean farmers and moved into cities. In 1934 there were 561,000 Japanese among the Korean population, most of them merchants or in professions, almost half of them living in the 10 largest cities. On the other hand, Koreans themselves migrate either to Japan or to Manchuria.¹⁷

¹⁵ Economic Handbook of the Pacific Area, Chapters I-II.

¹⁶ H. K. Lee: Land Utilization and Rural Economy, Chicago, 1936, pp. 281 ff.

¹⁷ C. Porter: Korea and Formosa as Colonies of Japan, *Far Eastern Survey*, Vol. 4, 1935, pp. 81-88.

Since the end of the Russo-Japanese War the Japanese have looked towards Manchuria as the most promising field for the agricultural settlement of their land-hungry and depressed peasantry, but for twenty-five years they have had



¹⁸ The Manchuria Year Book, 1932-33, Tokyo, 1932, pp. 101-102.

in 1931, most of whom are rice cultivators. They are especially concentrated in the newly established province of Chientao (Fig. 4), where they form the majority of the population. Next to Chientao come Pinkiang and Kirin as leading areas for Korean colonization.

Since 1906 Japanese authorities and organizations have worked out one ambitious scheme after another on the same theme: the Japanese colonization of Manchuria. Three major attempts were made between 1906 and 1931 to foster Japanese immigration there. Since the creation of Manchukuo the number of schemes has increased. In 1933 the new state granted to Japanese the right to own farming land. Heretofore Japanese had the right to own land only within the Kwangtung Leased Territory and the South Manchurian Railway Zone. This discrimination, according to Japanese authorities, was one of the reasons for the failure of Japanese settlement in Manchuria. The future will have to show whether or not this contention is true. In 1932 the Department of Colonial Affairs in connection with the Department of the Army brought out a plan of settling 100,000 subsidized farming families within the next 10 years. Japanese authorities are now planning to settle 1,000,000 farming households in Manchuria in the course of 20 years. By 1936 only four groups of carefully selected farmers had left Japan. Most of the men were between 22 and 30 years old, often unmarried. All of them were reservists. The plan is to create military colonies of farmers, a procedure that has been used in the colonization of Hokkaido and by the Russians in parts of Siberia.¹⁹ The first group of 500 armed reservists went to Yungfengchen, near Chiamussu in the Sungari Valley, in the spring of 1933.²⁰ After three years 12 of the men had been killed by bandits, and 152 had gone back to Japan; the hardships of pioneer life had been greater than their will power. The second group of 482 came to Hunanying, south of Yungfengchen, and the third of 259 to Peitokou, north of Harbin, in October, 1934, while the fourth group of 400 persons set-

¹⁹ A. Scheinpflug, *op. cit.*, p. 50.

²⁰ The geographer G. Fochler-Hauke visited this colony in August, 1935, and published his description: *Die Japanischen Versuchssiedlungen in der Nordostmandschurei*, *Zeitschrift für Geopolitik*, Vol. 13, 1936, pp. 99-111.

tled at Chengchiho and Hadaho, south of Mishan in north-eastern Manchuria, in March and April of 1936.²¹

According to the latest estimate, the total land area of Manchuria amounts to 92,500,000 hectares, or about 229,-463,000 acres, of which 15.1 per cent is cultivated and 19.2 per cent is cultivable but not yet turned to use. Therefore less than half of the land supposed to be arable is under plow.²²

Climatically, the best conditions are found in South Manchuria. But southern and large parts of middle Manchuria have been filled in recent years by millions of Chinese who came because of pressure of overpopulation and chaotic conditions at home and because of the great attractions offered by the wide and rich lands of Manchuria. In South Manchuria 73 per cent of the arable land has already been cultivated for many years, and in districts favored particularly with good transportation facilities it is almost entirely cultivated. It is impossible to drive out or buy out these Chinese farmers and replace them by Japanese. Not only would it lead to the most serious economic damage, but the price for land is too high.

What the Japanese farmer needs is cheap land. The greater proportion of uncultivated land is left in North Manchuria (Fig. 5). Conditions of climate and soil eliminate north-western Manchuria, so that only northeastern Manchuria can be considered for future Japanese settlements. The new province of Sankiang along the lower Sungari River is at present the center of Japanese colonization activity. The climate is continental. The winter is long (six to seven months), the temperature falls as low as -30° and -40° C. These winters are longer (Fig. 6) and much more severe than most of the Japanese farmers can or are willing to stand. The summers are as warm or even warmer than those of northern Japan and are also humid, owing to heavy rainfall during July and August caused by incoming monsoon winds.

It is characteristic that most of the colonists who went to Yungfengchen were from northern Hondo, which has not

²¹ Fifth report on Progress in Manchuria to 1936, Dairen, 1936, p. 130.

²² *Ibid.*, p. 162.

such a mild climate and is not as densely populated as the southern part. There is no information available for the other migrants, and it is not ascertainable whence the future colonists will come; but it would not be surprising if the settling of farmers from northern Hondo would be somewhat more promising than of those from the semitropical part of Japan.

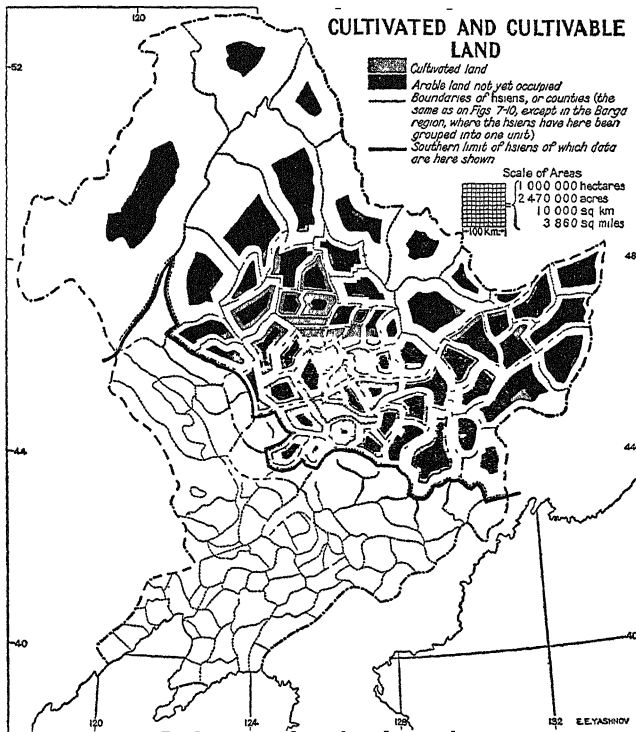


FIG. 5. Cartogram showing the cultivated land and the land still open to agricultural settlement in Northern Manchuria. The area left blank in each county north of the bold line inferentially represents the amount of non-agricultural land. (From *Pioneer Settlement*, Amer. Geogr. Soc., New York.)

There is every reason to see in the climate of north Manchuria the greatest hindrance for a large-scale Japanese immigration. "One can only wish that the Japanese people could send their surplus into regions that come closer to the climate of their home than does Manchuria."²³ It is true that the Chinese farmer can "underlive" the Japanese farmer,

²³ G. Fochler-Hauke, *op. cit.*, p. III.

especially during the initial period of establishing farming communities, but after that the Japanese farmer, especially when organized on a coöperative basis and when directed by agricultural advisers, should be able to compete with the

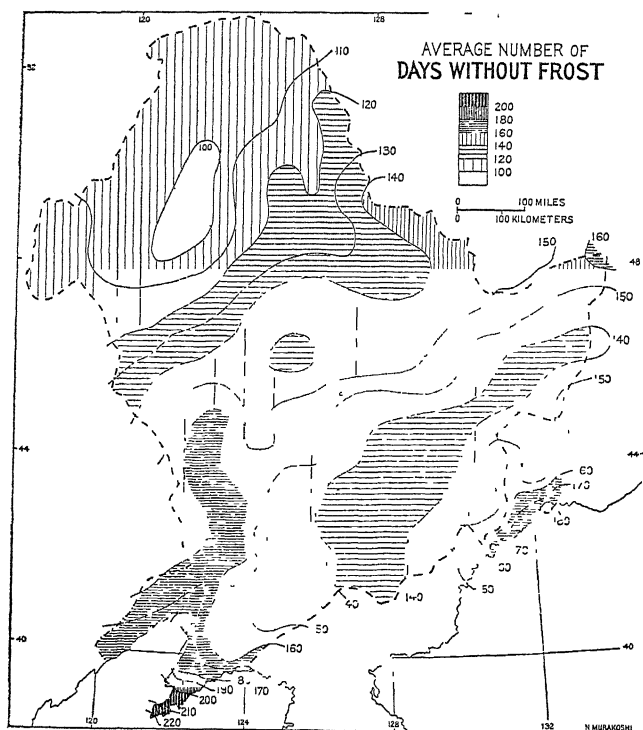


FIG. 6. Manchuria. Average number of days without frost. (From *Pioneer Settlement*, Amer. Geogr. Soc., New York.)

Chinese. The factor of competition²⁴ by Chinese is probably overestimated to a certain extent.

Migration to the Subtropics and Tropics

It is quite probable that even the largest scheme will not bring any considerable number of Japanese farmers and their families into north Manchuria, because they do not like the climate. Where are the areas really suitable to Japanese farmers? There is only one answer: in climates of mediter-

²⁴ The raising of cattle and sheep and the growing of wheat, sugar beets, hemp, flax, oilseeds, fruits, and tobacco should reduce existing competition.

anean, subtropical, and tropical type. Geographers have frequently made statements clearly indicating this. Bowman says:

But, unlike the European powers who hold their possessions for trade or native development of agriculture, the Japanese are themselves tropical colonizers. They form half the population of Hawaii and are spreading into the Philippines. Only the barrier of restrictive laws prevents them from figuring more largely in the population of northern Australia. Their ethnic penetration of the lands of other powers is slow and limited, but it is favored by their manner of living and the prime necessity of the white planter in the tropics of securing acclimated labor.²⁵

Among German geographers Haushofer for many years stressed the same point in numerous publications on Japan and the "geographical" situation in the Pacific. He refers to the Malay ancestry of the modern Japanese and shows that they do best in a country where rice, tea, and bamboo grow well. According to him the Japanese are a southern people driven to the northern boundary of their optimum area of settlement, and they find their most congenial zone of settlement in the warm seas of the south.²⁶

Recently Sapper made the following statement:

The Japanese belong . . . to the peoples who are by heredity conditioned to warm climes, and it is clearly apparent that this conditioning, thanks to the preponderance of a strong Malayan section of the populace which originated in the tropics, imposes strict limits upon their political plans. For while North Chinese have been thoroughly successful in pressing forward their colonization to the very edge of the Polar Regions, and South Chinese have expanded to the innermost tropics, evidencing at the same time their ability to maintain their gains permanently, the Japanese have not thus far been able to demonstrate an ability for colonization in colder lands. It must be admitted that the blame for this, next to the factor of inheritance, lies largely in an intellectual sluggishness. For, in fact, if up to now they have only very thinly settled the Island of Hokkaido, which has long been in their possession, the blame lies in the fact that they brought with them into this cold-winter region their light tropical house, the heating of which is wholly insufficient for a northern climate, instead of creating a comfortable artificial climate in their dwellings by adopting the warm Ainu house and the adequate Ainu heating. The same

²⁵ Isaiah Bowman, *op. cit.*, p. 614.

²⁶ K. Haushofer: *Japan's Werdegang als Weltmacht und Empire*, Berlin, 1933, p. 63.

obstacles have hindered a dense penetration of Japanese into Manchuria since its political annexation, while millions of Chinese have gained a footing in the same territory. As soon, however, as tropical regions were opened for colonization, many thousands of industrious husbandmen immediately established themselves, as in Hawaii or in the former German South Sea Islands. . . . A sojourn of undoubtedly more than 50 generations in the subtropic to temperate belt has not yet been sufficient to suppress in these people their tropic-born love of warmth; from which one must assume that they have spent many hundred previous generations in the tropics.²⁷

Japanese statesmen wish to direct the flow of their surplus farther north to Sakhalin and into north Manchuria because of imperialistic reasons and the absence of strong political resistance, but the Japanese farmers, the people, know a better, more natural direction if they have to migrate, and that is towards "Nanyo" (the South Seas), or similar countries. They have given us enough proof of their ability to work and settle permanently in tropical countries without its having a bad effect on their health, something the European is not able to do. We have only to turn our attention to Hawaii on the outer fringe of the tropics, to the states of São Paulo, Amazonas, and Para in Brazil, to Davao in southern Mindanao, and to the former German colonies in the Pacific north of the equator to realize this.

To Formosa

It is often argued that, as the Japanese did not make use of Formosa as a large-scale outlet for their people, this has proved that they cannot stand a tropical climate. Formosa had in 1930 a total population of 4,592,000 on an area of 13,000 square miles—a density of 340 persons to the square mile—a very high figure when we consider that the settlement possibilities are limited by the topography of the island. Only 27.8 per cent of the area is supposed to be arable, and 22.6 per cent has actually been cultivated; so that we have the high density of 1491 persons to the square mile of crop area.²⁸ Since the favorable parts of the island, the lowlands of the western half, have been settled for many centuries by

²⁷ K. Sapper: *Akklimatisation und Rasse, Zeitschrift für Rassenkunde und ihre Nachbargebiete*, Vol. 3, 1936, p. 235.

²⁸ Economic Handbook of the Pacific Area, Chapters I-II.

Chinese who came mainly from Fukien, the Japanese farmer was actually held away from the beginning, because of the difficulty in obtaining cheap land. The abundance of cheap labor prevented a migration of unskilled workers from Japan to Formosa. In 1933, 256,000 Japanese were living in Formosa, most of them in commerce, although a large number were in the mining industry of the northeast and in the plantation industry throughout the western plains. The Director of Colonial Affairs stated in 1927 that Formosa could absorb 300,000 Japanese within the next 10 years,²⁹ but since 1915 the increase of the Japanese population of Formosa has averaged a little over 5000 a year.³⁰ Formosa is of great value to Japan as a source of food supply and as a market but not as an area of settlement.

To the Japanese Mandate

The Japanese have shown their ability as tropical colonizers in the Pacific Mandate. Their number has increased rapidly.

JAPANESE POPULATION IN THE MANDATE ³¹

<i>Year</i>	<i>Total</i>	<i>Men</i>	<i>Women</i>
1920	3,671	3,097	574
1925	7,430	5,074	2,356
1930.... .	19,835	12,262	7,573
1933	32,214	19,484	12,730
1934	40,215	24,214	16,001
1935	51,606	30,985	20,621

During the first years of the mandatory administration the number of male immigrants greatly outnumbered the female immigrants, but the ratio has gradually been adjusting itself. Today the excess of men is by no means so great. Most of the Japanese (39,731 out of 51,606) are registered with the "Branch Bureau Saipan," under whose administration only 4297 natives are living. The Japanese are chiefly on the islands of Saipan, Tinian, and Rota, with only 6558 at Palau. The increase was caused by the development of the sugar-cane

²⁹ *Trans-Pacific*, Tokyo, October 15, 1927.

³⁰ J. E. Orchard: *Japan's Economic Position, The Progress of Industrialization*, New York, 1930, p. 39.

³¹ P. H. Clyde: *Japan's Pacific Mandate*, New York, 1935, p. 153; Annual Report to the Council of the League of Nations on the Administration of the South Sea Islands under Japanese Mandate.

industry, which employs the immigrants as tenant farmers. They came mostly from Okinawa, one of the Ryukyu Islands. The sugar industry had been started by the Nanyo Kohatsu Kabushiki Kaisha, or South Seas Development Company, which took over the state land rent-free until the industry was on a paying basis. The company erected several sugar factories which get their cane from three sources: (1) independent growers, who are few in number; (2) tenants, who cultivate land leased from the company; (3) plantations managed by the company. There is virtually no native labor in the sugar industry, a very remarkable fact. In 1935 sugar cane was grown on 8036 hectares, or about 19,850 acres. The total arable state land was estimated at 19,000 hectares, or 46,930 acres. According to the Japanese administration, there are still about 19,000 hectares, or 46,930 acres, that may be reclaimed for cultivation of agricultural crops. Native land cannot be sold or transferred to a Japanese or a foreigner unless sanctioned by the Director of the South Sea Bureau. This is necessary in order to protect the natives against losing their means of subsistence. In the case of the tenants, the land is cleared for them at the expense of the company, and the tenant generally pays 20 per cent of the crop as land rent, the rest of the cane being taken at a price regulated by the government, which is interested in creating satisfactory conditions for the Japanese immigrants.

The total sugar production of the Japanese Empire in 1934-1935 was 19,536,000 piculs, of which Formosa produced 16,749,000, Japan proper 1,900,000, the Mandate 1,200,000, and Hokkaido 555,000 piculs. All the sugar, with the exception of that grown in Hokkaido, is cane sugar. The comparison is interesting. In a few years Japanese capital has been able to create in the Mandate a sugar industry that is quite large in comparison with that of the homeland and that employs mainly Japanese labor.

The total native population of the Mandate, 50,540, is already outnumbered by the Japanese. It is revealing to compare the statistics of births and deaths during 1934.³²

³² Annual Report to the Council of the League of Nations, 1935.

	Births		Deaths	
	Male	Female	Male	Female
Japanese	996	922	300	238
Natives	609	602	582	520

The smallness of the islands will very soon limit the possibility of immigration. Japanese authorities estimate that there is room for 100,000 Japanese farmers, in addition to whom quite a number of fishermen and tradesmen could be accommodated.

Japan is the only colonial power that has built up an agricultural industry in a tropical colony, obtaining practically its entire labor force by migration from the mother country.

To Hawaii

The tropical Hawaiian Islands had in 1930 a total population of 368,336. The greatest racial group was formed by 139,631 Japanese, who came mainly from south Hondo. As mentioned before, the Japanese immigrated before the year 1898 in large numbers as contract laborers after the planters had been forced to stop the importation of Chinese labor, and from 1898 to 1907 they came as free laborers. The same arguments used against the Chinese also brought about restriction of Japanese immigration. In 1934, 43,059 Japanese were gainfully employed, 25,313 of them in commerce and handicrafts, and 16,467 as agriculturists, of whom 13,382 were receiving wages, most of the latter working on sugar plantations.³³ In the fishing industry, which is their monopoly, 1170 Japanese were engaged. The Japanese as a whole do well in the Hawaiian Islands. The climate suits them, and their economic status is much better than it had been at home. A problem lies in the change of occupation, especially with the second generation. To what extent is this the result of the education they have received in American high schools, after which they do not want to return to the work on the plantation?³⁴ In Hawaii the Japanese have the most favorable sex ratio among all orientals (16 males: 10 females). This is a

³³ Toru Ogishima: Japanese Emigration, *International Labour Review*, Vol. 34, 1936, p. 634.

³⁴ S. H. Roberts: *Population Problems of the Pacific*, London, 1927, p. 336.

guarantee that for a long time to come they will keep the leadership in numbers among the population of Hawaii, which is a few degrees farther south than Formosa. It is quite probable that their number in Hawaii would be larger than that of Formosa if the islands had not been closed to them.

To Brazil

Of special interest are the Japanese settlers in Brazil, whose number has increased to 173,500 during the period 1907-1934. Most of them came after 1924. Japanese immigration rose from 25,661 during 1916-1925 to 132,729 during 1926-1935.³⁵ The labor problem of the coffee planters in São Paulo started this migration. Since the restriction of Italian emigration in 1927 the demand for Japanese laborers has grown. Japan is not particularly interested in a migration of contract laborers who will return after a few years. Therefore everything is done to use the labor demand of Brazil for new population outlets. A number of organizations have been founded to further such results. The leading organization is the Kaigai Kogyo Kaisha, or International Development Company, which brought 113,267 immigrants to Brazil during 1917-1933. The company recruits the migrants, examines them carefully, and prepares them in many ways in Japan for their future life in Brazil. Since 1927 a number of emigration societies have been created, which give assistance to their members wishing to emigrate. In order to become a member one has to pay 50 yen and be the head of a family in which at least three people are able to work. All of the societies are combined in the Federation of Emigration Societies, which founded in Brazil the Brazilian Development Society, or Brazil Takushoku Kumiai. At the end of 1934 it owned some 200,000 hectares, or 494,000 acres. A third organization is the Nambei Takushoku Kaisha, or South American Development Company, founded in 1928, the owner of about a million hectares in the state of Para. On its estates it had about 2000 Japanese at the end of October, 1934. Finally, there is the Amazonia Institute for Industrial

³⁵ Immigration and Settlement in Brazil, Argentina, and Uruguay: I, *International Labour Review*, Vol. 35, 1937, p. 217.

Research, founded in October, 1930, at Parintins (2.45° S. and 56.33° W.) near the eastern border of the state of Amazonas which owns 1500 hectares, or about 3700 acres. The Institute, which intends to train immigrants for work on a concession of one million hectares (2.47 million acres) connected with it, consists of a central experimental farm, a meteorological observatory, a hospital, and a training school.³⁶ Two model colonies are established in the valley of the Andeira, a few miles away, as an example for future colonies. So far, the experiments in the states of Para and Amazonas are in the initial stages, and the majority of Japanese have gone to southern Brazil under the supervision of the Kaigai Kogyo Kaisha. With a few exceptions the immigrants sign contracts for one, four, or six years with a coffee planter. Contract laborers usually get a guarantee that the return passage will be paid by the employer, but here this is not done because the homeland does not want the migrants to return. It is for this reason that the passage is paid to Brazil. During the period of the contract the migrants become familiar with the country and the people, learn the agricultural methods, and are prepared to start a farm of their own—the final goal of the whole plan. Japan is not content to have her subjects as permanent plantation laborers in foreign countries. She wants them to live in group settlements, more or less as they would live at home. For that reason there is the careful selection and preparation of the migrants. They become Brazilian subjects but keep their Japanese citizenship too. The government advises them to adopt the Catholic faith—and for this reason does not issue passports to Buddhist or Shinto priests. Japanese schools with Japanese teachers have been established in large numbers.

After the laborer has finished his contract, he is usually able to start either as tenant or as independent farmer. He leases or buys land from the company in one of the settlements that have been established in the coastal lowlands south of Santos, with the center around Registro and Iguape.³⁷

³⁶ Tsukasa Uyetsuka: *Our Emigrants in Amazonia, Contemporary Japan*, Vol. 4, 1935, p. 86.

³⁷ Registro is the greatest achievement of the Kaigai. On the 50,000 hectare concession there have come into existence in approximately 10 years: a power

There are, furthermore, Japanese farm settlements along the railroads from São Paulo to the highlands of the state (Fig. 7). The colonists raise coffee, rice, bananas, sugar cane, cotton,³⁸ tea, and silkworms. Rice is one of their important products. Brazil harvested 45,000 tons of rice in 1915 and 1,048,000 tons in 1932. Tea culture has been successful in recent years. The farmers who rent their land from the

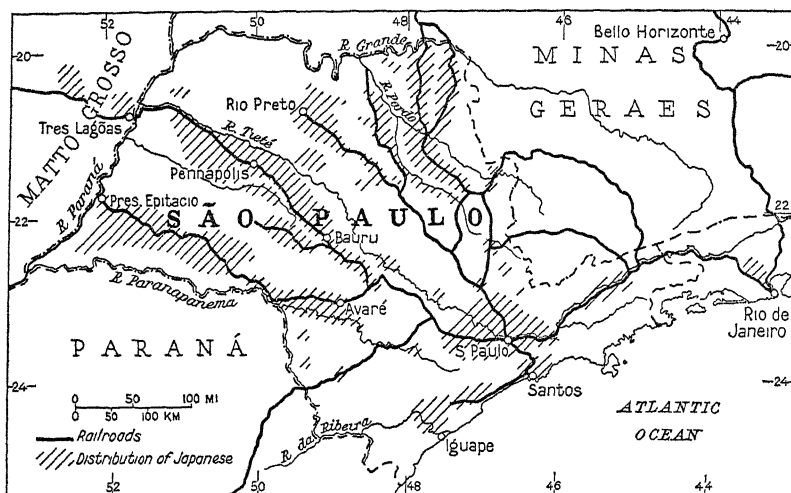


FIG. 7. Distribution of Japanese settlers in São Paulo.

company pay with a part of their crop. The chief function of the Kaigai Kogyo Kaisha is the marketing of the agricultural products of the settlers. Most of them are shipped to Japan.

Colonization of the states of Para and Amazonas is of a somewhat different character, adapted to local conditions. The colonists go to the land without having worked first for several years under contract, because there is no demand for labor. They are trained in model colonies and are then placed on land that is partly cleared. The Nambei Takushoku

plant, hospitals, churches, schools, an agricultural research laboratory, a stock-breeding station, a sugar factory, rice mills, 306 kilometers of roads, 34 kilometers of railway, and a port at Ribeira, which had a trade of 395,000 milreis in 1920 and of 2,196,000 in 1931.

³⁸ "Japanese farmers are credited with raising nearly one-third of the country's cotton." *Far Eastern Survey*, Vol. 5, 1936, p. 237.

Kaisha owns two areas of considerable size in the state of Para: one at Acara, an area of 600,000 hectares, or 1,482,000 acres; and another at Monte Alegre, an area of 400,000 hectares, or 988,000 acres. It also has land along the Bragança Railway in the district of Castanhal. Settlers have to pay 300 yen, which covers living expenses of the first year and the cost of equipment. The company helps the settler to start and advises him in the choice of crops.³⁹

T. Uyetsuka, the president of the Institute Amazonia, recently gave a most optimistic report concerning the possibilities for Japanese colonization in the State of Amazonas. He describes the climatic observations made by the meteorological observatory and comes to the following conclusions:

Neither too warm nor too cold, typical of a temperate zone, it is a climate in which man cannot only live but can do hard work. . . . Throughout the year there is not a single night when one cannot sleep owing to the oppressive heat. . . . The four hundred Japanese immigrants who have been working hard in a strange climate for the past five years are entirely free from epidemic. None of them have succumbed to any disease. Moreover, there are no in-patients in the three hospitals attached to the Institute, which fact bears eloquent testimony to the healthy condition of the Japanese colony. . . . The staple agricultural products of the Japanese colony are rubber, cacao, guarana, castanea, jute, ramie, rice, cotton, tobacco, and sugar cane.⁴⁰

This experiment in the interior of the Amazonas Basin is still too young to form the basis for any definite conclusion on the future possibilities of the settlement scheme. It will require a considerable amount of capital. The greatest difficulty lies in the extreme remoteness of this scene of pioneering. We cannot expect that these colonies in the Amazon Basin will develop with the speed of those in southern Brazil, which are operating under much easier conditions. They have a local market which brings them a cash income for goods that cannot stand long transport. The greatest need is for a continuous influx of vigorous young men and women with the true pioneer spirit and minds made up to work hard and

³⁹ The settlers produce cocoa, rice, corn, sweet potatoes, cotton, hemp, tobacco, peanuts, vegetables, and fruit.

⁴⁰ T. Uyetsuka, *op. cit.*, pp. 87-88.

give up all the comforts that an established community has to offer.

Whereas oversea Japanese usually send their savings home, all the money of the settlers in Brazil has to be invested there, a procedure that should greatly help to bring the whole colonization to a sound basis. In future years new immigrants can probably work as laborers for some time on the farms and estates of Japanese who have been residents for many years.

Japanese emigration to Brazil increased from 3689 in 1924 to 22,960 in 1934, but in the latter year the Brazilian government decided to limit the immigration from Japan to a considerable extent; so that even Brazil, with all its possibilities for Japanese colonization, is closed except to a very small number.⁴¹

To Paraguay

The Paraguayan government, in its effort to increase the population of Paraguay, contemplated a scheme whereby 50,000 Japanese families would be introduced into the country over a period of 20 years. As yet nothing has come of this ambitious plan, although the government has recently issued a decree authorizing the entry of 100 families of Japanese farmers by way of experiment. The first group was settled at Ibitymi, on the Central Paraguay Railway some 80 miles from Asuncion.⁴²

To the Philippines

In recent years the Japanese have been successful settlers in the Philippines. They number around 20,000, of whom 14,000 live in the Province of Davao on the Island of Mindanao. Their chief interest there is hemp growing. In 1903 Japanese labor was brought from Okinawa to Luzon for road-construction work, and in 1904 an enterprising young Japanese suggested the employment of these men in the hemp industry of Davao, which was struggling with a labor shortage. The Japanese worked for some time on the plantations

⁴¹ The quota for Japan allows an immigration of some 3480 a year.

⁴² R. H. Tottenham-Smith: Report on Economic and Commercial Conditions in Paraguay, Dept. of Overseas Trade, No. 662, London, 1937, p. 33.

but finally made themselves independent hemp growers. The high prices during the World War caused a rapid expansion of the hemp-growing industry, and the number of Japanese increased to more than 10,000. During the depression that immediately followed the War a number of hemp plantations belonging to American, Spanish, and Filipino planters were closed. The number of Japanese growers temporarily decreased, as many returned to Japan; but those remaining in Davao went on producing and took over other plantations. Immigration from Japan was resumed in 1924, and now the Japanese are the leading producers of the whole province. In addition to the hemp industry, they dominate the copra, lumber, and fishing industries of Davao. During the year 1934-98 Japanese vessels came to Davao, but only 4 American ships.

Recently the Filipino government became alarmed by Japanese domination in the economic life and development of the Province of Davao. Commissions were sent out to investigate the landholdings. In 1935 the Japanese owned 57,350 hectares or 130,755 acres. The holding of 28,098 hectares was legal; the other 29,251 hectares were public lands that had been given to Filipinos and Americans who leased them to Japanese, usually for a period of 25 years.⁴³ Such leases are illegal because they violate the conditions under which public land is given to Filipinos or Americans. Corporations can only lease public land if 61 per cent of the capital belongs to Filipinos or Americans. In the past Japanese have been able to find Filipinos, especially lawyers, willing to hold this 61 per cent.

The law forbidding the immigration of contract labor into the United States, its territories, and insular possessions, prevents the importation of Japanese contract laborers. The laborers of Davao have to come with their families as free immigrants. The government does not pay their passage, as in the case of the migration to Brazil, but the passage is much cheaper between Japan and Mindanao. The migrants are selected under government control, chiefly from the Ryukyu Islands and south Japan. As in Brazil, they take over com-

⁴³ Data taken from unpublished statement by J. R. Hayden.

pany land as tenants and pay their rent with a part of the hemp crop, the rest of which is bought by the company. In addition to hemp they raise all the foodstuffs needed for their families. An experimental farm introduced a large number of plants in order to find out about their growth possibilities on Philippine soil. The guidance of this farm has been of great help to the Japanese farmers. In spite of a suitable climate and an abundance of rich soil⁴⁴ it has been impossible to enlarge the Japanese farming communities because of the present land laws. The Japanese hemp growers have made Davao a prosperous province and one of the leading hemp-producing centers of the world. Seventy per cent of the roads of Davao have been built by Japanese. Most of the export and import trade as well as the retail business is in their hands. There are approximately 190,000 Filipinos and 14,000 Japanese, but the latter pay half of the taxes. They are the economic backbone of the province.

In other parts of the Philippines the Japanese are rapidly strengthening their position in the retail trade and are taking the place of the Chinese. They now control 35 per cent of this trade, which they were forced to take up when the Chinese started a boycott against Japanese products. The fishing industry is in their hands. Most of the boats are owned and run by them. They have brought with them modern methods of deep-sea fishing and thus supply the Filipinos with one of their two staple foods.

Filipino and other authors have stated that Japanese emigrants prefer a more temperate climate and therefore will not voluntarily go to a tropical country, and point to Formosa as the proof. But, as has been shown above, the population density of Formosa is high, and the economic opportunity has not been attractive enough to draw more Japanese colonists. On the other hand, 173,000 Japanese farmers have settled in Brazil and 14,000 in Davao (7°-8° N.), and there are no signs that they do not like the climate. The Japanese will go into subtropical and tropical regions if immigration and land laws do not prevent them.

⁴⁴ The province of Davao alone has 1,929,724 hectares, of which more than 65 per cent are classified as suitable for agriculture.

Circumstances Favoring Successful Migration

The main result of an examination of Japanese migration is the knowledge that Japanese farmers go only very hesitatingly northward to Sakhalin and northern Manchuria but much more willingly into subtropical and tropical areas, especially when they are invited by foreign planters or when they have the backing of Japanese development companies which are the owners or lessees of large tracts of land. Countries with an abundance of cheap labor do not offer sufficient inducements to Japanese farmers and laborers. The migrants come with their families, work as contract or free laborers, rent or buy land from the company, knowing that they will not have to struggle for a market for their produce, because that problem is taken over by the company, which has the greatest interest in the welfare of its farmers and laborers. The tenant farmers usually have the opportunity of becoming owners of the land they till. The company can gain only when its settlers are contented and successful, because reports go back continually to relatives and friends of the migrants, and migration would stop very soon if it became obvious that it was a failure. At the same time the Japanese government is controlling the work of the development companies and the conditions under which the emigrants live. There is no country in the world that has better control over the migrations of its subjects. Every phase is supervised: the recruiting of the emigrants, their preparation and physical examination, their transport—in many instances the state pays the passage entirely or subsidizes the shipping companies—their arrival in foreign countries, and their life either as laborers or farmers. If the migrant has to work as a contract laborer, his housing, wages, and working conditions are supervised; thus he is protected against abuses which so often accompany contract labor. The country wants its sons and daughters to live the same kind of life they would have lived at home. The farmers produce, besides their accustomed staple foods, crops for which there is a demand on the world market or at home.

This control exercised by the government is the result of the

previous experiences of the Japanese in the field of migration of their subjects, experiences that have often been very discouraging, especially in North America.

Meager Results of Japanese Migration

In spite of the organization that surrounds Japanese migration one faces the striking fact that there are not quite a million Japanese residing in foreign countries, and only 1.8-1.9 million if we include Japanese colonies and parts of the Empire outside of Japan proper. Emigration, numerically considered, has failed to solve the population problem, a fact that was to be expected. In the report of the Fifth Conference of the Institute of Pacific Relations we read:

It came as a great surprise to many new members of the conference to discover that their Japanese colleagues without exception dismissed the idea that either internal redistribution of population or emigration abroad offered any solution to the population problem. . . . But what is often overlooked is that there is a difference between saying that migration is not a real solution and saying that it is of no use at all.⁴⁵

This last statement must be stressed emphatically. Migration has its place among the ways of relieving pressure of population. But what are the reasons that emigration is not larger and more effective? Some of them are:

1. High density in the outer parts of the Japanese Empire
2. Climatic conditions in countries north and northeast of Japan proper
3. Difficulty in persuading Japanese farmers and laborers to migrate
4. Restrictions placed upon Japanese migration in countries like Hawaii, the United States, Canada, Australia, and most of the colonies of the Pacific.

Each one of these reasons is important, and together they keep down the migration. Reasons 1 and 2 cannot be changed, but 3 and 4 may. If the restrictions, at least in part, should disappear and the Japanese could find their way especially into subtropical and tropical countries, the example would be the best propaganda for many of those who live under crowded

⁴⁵ Problems of the Pacific, 1933, Chicago, 1934, p. 123.

conditions. The larger the number of settlers who go to a foreign country the easier will it be to find new migrants to follow them. The best example of this is the migration to Brazil. In the beginning the Kaigai Kogyo Kaisha was not able to find enough migrants to supply the coffee planters with the number of laborers needed. But the number increased steadily until 1934.

Possible Future Direction of Japanese Migration

Newspapers reported recently that the Japanese government intends to take up negotiations with powers owning colonies in the Pacific in order to bring about the acceptance of Japanese immigrants. Dutch and British Borneo, Dutch and British Guinea, the Fiji Islands, and Samoa are especially mentioned.

There are two possible directions of southward migration: to the Australasian Mediterranean and to the Pacific Islands.

In the Australasian Mediterranean, parts of the Philippines, Borneo, and Celebes are very thinly populated and have vast forest areas which could be cleared and brought under cultivation just as well as the western part of British Malaya, the east coast of Sumatra, Assam, and other plantation zones that have been developed through the coöperation of Western capital and Asiatic labor.

In the Pacific, one of the largest islands of the world, New Guinea, is practically undeveloped. Very little has been done in the British Solomon Islands, New Hebrides, and New Caledonia. Only Hawaii and Fiji have seen economic development of their resources.

All of these areas belong to the tropics and have a population that is far below their capacity. An extremely small white population is formed by officials, planters, mining engineers, traders, and missionaries. What are the possibilities for the Japanese were the colonial powers to allow their coming?

Possibilities in the Philippines

The Philippines are in the lead among the countries of the Australasian Mediterranean where Japanese capital could find excellent opportunities to develop tropical areas. A map

of the distribution of cultivated lands in the Philippines (Fig. 8) shows a great unevenness. The people are concentrated in a few very densely settled areas, whereas wide parts of

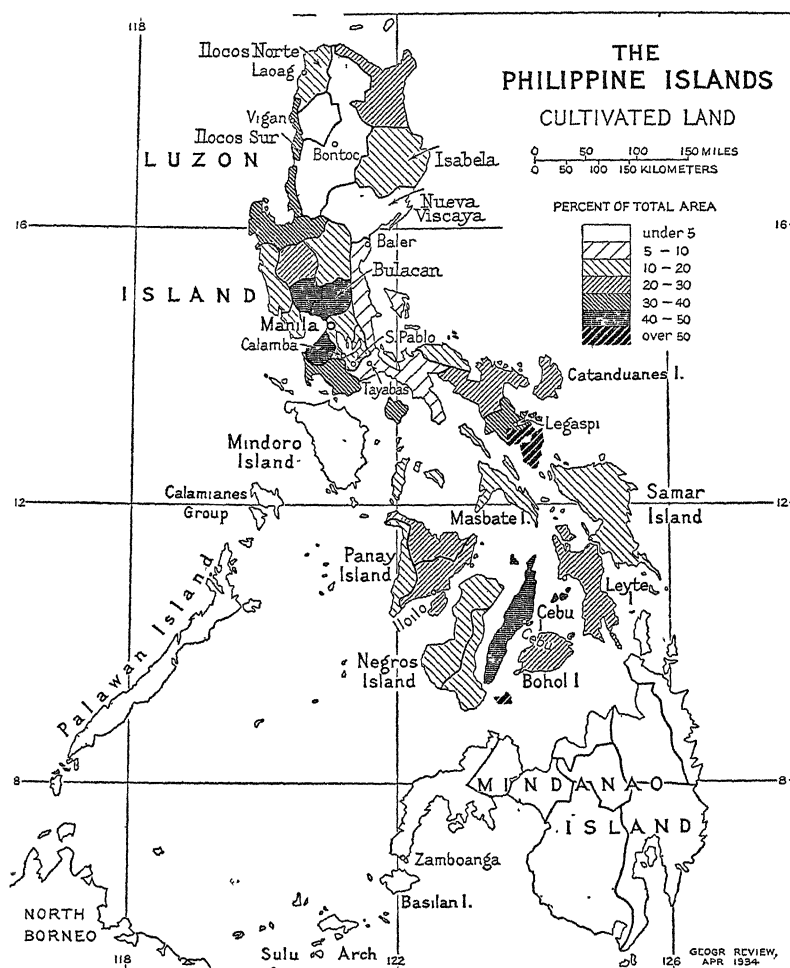


FIG. 8. The distribution of cultivated land in the Philippine Islands in 1924 according to figures from the Bureau of Forestry. In sum 12.5 per cent of the total land area of the Philippines was under cultivation, or not quite one-third.

the islands have scarcely any population. To the populated areas belong most of Luzon—especially the Ilocos coast—also the islands of Cebu and Bohol and parts of Panay and Negros. Among the underpopulated areas Mindanao ranks first,

one of the most thinly populated islands of the whole Philippines. Other sparsely settled islands are Samar, Leyte, Basilan, Mindoro, and Palawan.

During the past 50 years population pressure in the congested areas has become so great that it has caused a serious problem. The result was the beginning of seasonal and permanent migrations on the islands, between the islands, and, in the last decades, overseas to Hawaii and the United States.⁴⁶ As long as the government is financially not strong enough to spend large sums for the redistribution of the population, it will be an extremely slow process to relieve the pressure by clearing and settling forest areas. If the American administration had encouraged the investment of capital in agricultural enterprises, the labor demand would have been able to speed up the movement from congested areas. As a result laborers would have taken up land in the neighborhood of plantations, as has been the case in Assam and other parts of southeastern Asia. This, however, was prohibited by the uncertainty of the length of the American protectorate over the islands and the land policy. Instead of allowing the development of plantations the administration tried to keep the land for homesteading of small Filipino farmers. Citizens of the Philippines and of the United States can apply for 24 hectares of public land as a homestead. They can buy as individuals as much as 124 hectares, and up to 1024 hectares as corporations or associations if at least 61 per cent of the capital belongs to citizens of the Philippines or the United States. An equal amount can be leased under the same conditions. These laws make it difficult for Japanese to obtain the right to take up land for agricultural purposes.

Today more than 60 per cent of the total area of the Philippines is still covered with forests, 53.7 per cent of which are considered commercial forests. Only 12.5 per cent of the land is under cultivation, but 55 per cent is thought to be cultivable.⁴⁷ These figures show that the islands should be able to maintain a much larger population than they have today.

⁴⁶ Bruno Lasker: *Filipino Immigration to Continental United States and Hawaii*, Chicago, 1931.

⁴⁷ *Economic Handbook of the Pacific Area*, Chapter II, pp. 73-74.

In 1930 the population was 12,251,000, a density of 107.4 persons to the square mile. The density to the square mile of crop area is about 800, which is quite high but not really serious considering the enormous reserve of unused lands. "The Philippines, taken as a whole, are less than moderately settled."⁴⁸ The Commonwealth has only one-fourth of the density that prevails in Japan, and 55 per cent of the land is considered cultivable against 20 per cent in Japan.

On the basis of the 1930 conditions of cultivation, standard of living, climate, soil, advance in technology, and others, the Philippines can comfortably support an optimum population of 50 millions . . . the maximum capacity of the Philippines to support a population dependent upon agriculture alone will not be less than 90-100 millions of people. The last figure will in all probability be the saturation point of the population capacity of the Philippines. . . . It should be understood, however, that when the 90-100 millions of population is reached the standard of living must necessarily go down, perhaps to the level of the very densely inhabited countries of Porto Rico, China, Java, and Japan.⁴⁹

The population problem of the Philippines is not caused by a uniform population pressure but rather by an uneven distribution.

The rich agricultural resources, the fishing grounds, the important iron deposits at Surigao in Mindanao and other mineral deposits in various parts of the islands, the valuable commercial forests—all offer large attractions for Japanese; and it is a question whether the Commonwealth might not gain were Japanese capital and Japanese and Filipino labor together to develop at least some of these resources, as long as the Filipinos are unable to do so alone. One has only to recall the fact that the 14,000 Japanese of Davao pay half of all the taxes of that province and have constructed 75 per cent of all the roads. Their activity has attracted not only their own laborers but also Filipinos. Japanese hemp growers employ a good number of Filipino laborers. Furthermore, the Japanese-grown hemp is better than that grown by Filipinos

⁴⁸ C. C. Cruz: Population and Land Utilization in the Philippines, *Problems of the Pacific*, 1933, Chicago, 1934, p. 384.

⁴⁹ *Ibid.*, pp. 387-388.

because of scientific methods of cultivation and better preparation for the market.

Possibilities in Borneo

Among countries often mentioned as possible outlets for Japan are British and Dutch Borneo. Borneo occupies a central position in the Australasian Mediterranean. The climate is tropical, and like that of the Philippines is determined by monsoon winds. Wide alluvial lowlands in the south, west, and north have a somewhat denser population than the mountainous interior. The whole island has a population not much larger than 2.5 million and a density below 10 persons to the square mile. Agricultural production is extremely small. The natives are rice growers, and to a small degree rubber growers, and occupy only a fraction of the alluvial coastal and river lowlands. In addition there is some land taken up by plantations producing mostly rubber, but the plantation industry is unimportant compared to that of Malaya or East Sumatra.⁵⁰ More important are the oil and coal resources of the eastern and northwestern parts of the island.

Chinese lead numerically among the non-native population; in 1930 they numbered 135,000 in Dutch Borneo, of whom 109,000 lived in West Borneo. In contrast to other parts of southeastern Asia they are not working on plantations and in mines, nor are they so much in trade. They are mainly farmers who cultivate rice, coconuts, pepper, rubber, gambier, and vegetables. Japanese have appeared in recent years in coastal localities but only as shopkeepers. They compete with the Chinese and are able to undersell them with the low prices of their goods.

Japanese farmers or laborers will probably not immigrate unless they are brought in by Japanese or other capital. Their importation is quite possible owing to the fact that there is no native labor to be had in Borneo. The Malays and Dyaks who form the majority of the population are not accustomed to permanent labor and do not need to work for wages as long

⁵⁰ In 1934 the plantations of West Borneo had 8474 hectares under cultivation; south and east Borneo had 10,121 hectares. East Sumatra, on the other hand, had 360,189 hectares. (Indisch Verslag, 1935, II, pp. 220-221.)

as they can obtain with very little labor all that they need for their livelihood. Labor has to be imported, and that is expensive. In 1928 the recruiting costs for one Javanese laborer to East Sumatra were as high as 125 guilders; a Chinese laborer was even more expensive. The costs for transport and recruiting have gone down, but the labor problem is still one of the most serious in all plantation areas of southeastern Asia. Ceylon obtains its labor force from southern India; Assam from the Ganges Valley and the Chota Nagpore Plateau; Malaya from southern India, Java, and southern China; and East Sumatra depends upon Java and southern China. Nearly all the laborers return after a few years and have to be replaced. As long as world prices for plantation products were high, the companies never gave serious thought to this situation, but the depression has made them look for a possible reduction of costs. Ways of solving the labor problem are often discussed at meetings of the planters' associations. The best proposal seems to be to induce the laborers to stay permanently on or near the plantations. The companies are willing to give a part of their land so that laborers with their families can form permanent communities and become part-time farmers raising vegetables and other foodstuffs for themselves during the time they are not needed on the plantations. This plan has several advantages: it makes plantation countries less dependent upon large importations of rice and other staple foods for the labor forces—thus avoiding the serious financial difficulties that faced them in years when there was a rice shortage in the leading rice countries; wages can be lower because the families raise their food on company land that otherwise would not be used; the number of women increases, and the laborers are less anxious to return to their home communities—this reduces recruiting costs for new labor; the laborers do not have to be sent back whenever there is less work to do, for they can support themselves on their own land until they are again needed; the country as a whole is supplied with a more stable population and loses less money in the form of remittances.

This is a very important development, one that could lead finally to a large permanent population of Indian, Javanese,

Chinese, or Japanese farmers who, as tenants or proprietors, would raise all the produce now raised by plantations that are dependent upon a continuous importation of labor. Already large quantities of rubber, coffee, sugar cane, and other products are raised by non-European farmers. The plantation system, however, seems to be necessary in order to bring the movement under way: to open the tropical forest at least in a few places and to take away some of the fear that the Asiatic farmer has of migrating and pushing into those forests. Each plantation is a potential nucleus for new settlements which in turn find a valuable market on the plantation.

Large parts of Borneo probably will never permit settlements of farmers because of the presence of many diseases. Favorable districts can become the scene of Japanese settlements only if, as in Brazil, Japanese capital can acquire large concessions which must be cultivated with the help of imported labor. There is no reason why Japanese agricultural laborers cannot do the work otherwise done by Chinese, Indians, or Javanese. After some years of work they would save enough to start their own farms.

Possibilities in the Pacific Islands

There has never been an important development in the tropical parts of the Pacific that did not use imported Asiatic labor. One need only mention Hawaii, Fiji, Samoa, Nauru, and the Japanese Mandate. Where colonial administration is opposed to the use of Asiatic labor and native labor is employed the results are invariably unsatisfactory. Melanesians, Polynesians, and Micronesians have one characteristic in common: an inability to work every day steadily for a fixed number of hours. The native cannot or will not work continuously if he has his own way, a fact well known to every entrepreneur in the Pacific. Whenever young men are forced to leave their native communities to work as indentured laborers on other islands or in other districts, the native life is broken up, diseases are brought into communities where they were previously unknown, and the economic strength and the birth rate of the natives decrease. It is practically impossible, furthermore, to prevent abuses of indentured labor. Recruiting starts the

abuses, subsequent treatment is not always of the best, and very often the laborers are cheated in their pay.⁵¹ Complaints are frequent from missionaries in Papua and the former German colonies now under Australian administration of the destruction of native communities as a result of indentured labor on the plantations and in the gold mines. The administration declares that indenture is to raise the social and economic standards of the natives. Actually, indentured labor has to be used because it is the only way to obtain workers necessary for the few plantations and mines, since Asiatic labor is not admitted under the restrictions of the White Australia Policy, which is extended to tropical New Guinea. Wherever indentured labor as such has been given up and the natives have been forced to pay a high head tax there is the same result—the tax compels the natives to work on plantations or in mines in order to obtain the necessary tax money.

Shortage of labor is the main reason for the extremely limited economic life in New Guinea. Labor shortage is not restricted to New Guinea; it is found everywhere in the Pacific. The only solution is the employment of Asiatic labor.

There was no alternative, no middle way. This way lies the future of the Pacific, if facts and logic mean anything. The writing is clear for him who will read. A simple process of elimination arrives at this result only—that Asiatic immigration is inevitable, and more, that it is desirable. Events have been tending in this direction for a considerable time, although administrators have not always liked to face the rather unpalatable fact that the development of their lands—French and British and American alike—is completely dependent on Asiatic labor supplies.⁵²

Among Asiatic laborers the Chinaman has been most frequently employed, but in addition one finds the Indian, Javanese, Tonkinese, Annamese, and especially the Japanese. Today there are about 200,000 Japanese living in Oceania, the majority of them in Hawaii and in the Japanese Mandate. That their number is not larger is due only to the restrictions that prevent their migration. "Although the Japanese peasant is

⁵¹ S. H. Roberts: *op cit.*, pp. 210-212; S. H. Roberts: "Racial and Labour Problems," *The Australian Mandate for New Guinea*, edited by F. W. Eggleston, Melbourne, 1928, p. 78.

⁵² S. H. Roberts: *Population Problems of the Pacific*, p. 282.

traditionally supposed to dislike colonization, there is a movement that must make the observer pause, as more than 132,000 [200,000] of these Japanese settlers are in the Pacific Islands proper.⁵³

Dutch New Guinea with an area of 161,000 square miles, the Australian Mandate (93,000 square miles), Papua (90,540 square miles), British Solomons (14,800 square miles) and New Hebrides (5100 square miles) belong to the Pacific Islands that could gain immensely through immigration of Asiatic laborers. There is no reason why all of these islands should produce only large quantities of copra. New Guinea is rich in timber and in minerals. Sugar cane, coffee, tea, cocoa, rubber, nutmeg, vanilla, bananas, tobacco, sisal, kapok, and cotton are some of the products that could be raised most widely in the Pacific and especially in Melanesia.

It is, indeed, impossible to study the Annual Reports without forming a conviction that the territory [Papua] possesses many thousands of acres of agricultural land as fertile as any in the tropics, much of it in regions of reasonable accessibility. There are immense flats of alluvial soil, suitable for the cultivation of coconuts, rubber, and sugar; in higher altitudes there are lands admirably fitted for coffee and tea; and almost all tropical products can be grown in one part of the country or another.⁵⁴

The above relates to Papua, but the same can be said for all of New Guinea and the island groups of Melanesia. In spite of all resources, however, agricultural and mineral, capital cannot be attracted as long as the only available labor supply is native. With the help of Asiatic labor a plantation development could be started that would create exports including more than copra, exports such as those of Hawaii, Fiji, and the Japanese Mandate. Immigration should be by families rather than by single men, otherwise the unsatisfactory conditions would develop that have so often been described by the commissions sent to investigate various colonies employing imported labor. If the plantations would guarantee satisfactory living conditions for the workers and their families, Japan would probably be willing to send agricultural labor to any

⁵³ *Ibid.*, p. 291.

⁵⁴ British New Guinea: Handbook prepared under the direction of the Historical Section of the Foreign Office. London, 1920, p. 40-41.

part of the Pacific where a demand might arise. The families should have the opportunity of becoming free farmers, as in Brazil, after they have worked a certain period for the company that originally imports them.

The development of vast unused areas of the Pacific would in this way be facilitated and at the same time means be found to alleviate the population problems of the Asiatic countries, particularly Japan. Political obstruction has so far been the main obstacle to Japanese migration in the Pacific beyond the areas of Japan's political control. The American position in Hawaii has not been endangered because of the presence of 150,000 Japanese who have contributed most successfully to the economic development of that island group. A peaceful economic and agricultural development of suitable parts of Dutch, British, French, or American possessions in the Pacific by Japanese capital (if no other capital is available or interested) and introduction of Japanese labor along lines that have been tried out in Brazil, Hawaii, the Japanese Mandate, Davao, or in Fiji with Indian labor, could only serve to increase production, trade, and economic life in the Pacific and might ease some of the frictions and tensions existing today. Where lies the greater danger to peace—in the forced upkeep of the status quo of migration laws, or in a peaceful change in these laws, at least in areas where Western powers can never expect to settle their own subjects, and where economic development is now impossible because of the quality of native labor, but where Japanese labor and Japanese peasants will be successful because "the Japanese are themselves tropical colonizers"?

POSSIBILITIES OF SETTLEMENT IN AUSTRALIA

By Griffith Taylor

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I

SINCE the publication of his first essay in 1911,¹ the writer has made several attempts to gauge the possibilities of future settlement in Australia. In this first discussion the main criterion considered was the total annual rainfall. It has often been stated that the Commonwealth government in its attempts to open up the empty areas "has been leasing rainfall rather than land." While annual rainfall still remains the main factor, a dozen other controls have also to be considered; and of these some of the most important have been adequately charted only in the last decade. Each continent has its own controls of future settlement. For instance, in Canada, to which the writer has now transferred his main attention, temperature is the major control and rainfall takes no more than second rank. A brief summary of the gradual incorporation in the study of more and more environmental factors will serve to show the kind of problem we have to solve, as well as its complexity.

It was soon obvious that the least attractive portions of Australia were not necessarily those with the least annual rainfall. The region in the south, with eleven or twelve inches a year, could grow wheat fairly regularly; whereas in the north this amount was far too small for crops or even for stock raising in many areas. High temperature (as leading to high evaporation) had to be considered as well as the rainfall totals. Not for many years was the formula of Köp-

¹ See Bibliography on pp. 226-227.

pen, the German climatologist, used in Australia to find the varying limits of the desert with rain falling in different seasons. It was obvious that the light winter rain of the south was of more value than the light summer rain of the north. Cannon in 1921 introduced the concept of "effective rain," which emphasized the negligible value of light showers in arid regions. The agriculturist showed that it was the winter rain (falling from April to October) which determined the profitable areas for wheat. Even so, the season of rain was not the only factor to be considered. Rain reliability was first charted by the writer about 1917 and was found to be largely independent of the season of rain but varied with rain origins and with distance from the sea.

Other important controls determining future settlement, especially in the tropics, were found to be linked up with humidity and discomfort. Diseases are relatively rare in the Australian tropics, but discomfort due to the muggy climate is nearly universal. The writer in 1916 devised a technique of "climographs" to compare Australian conditions in this respect with those all over the world. It was found that Townsville resembled Calcutta, while Darwin was a "homoclimate" of southeast India, and Broome's climate was like that at the mouth of the Congo in tropical Africa.

Topographic and edaphic controls were also found to play an important part in deciding where future population will dwell. The actual areas of "no population" were found to agree with the limits of the "fixed dune" areas in arid Australia. Here was an edaphic control that could be deduced from an accurate survey of the native vegetation. About 1865, Surveyor Goyder showed the value of such a survey in the region east of Lake Torrens, but it was not until 1936 that a reasonably accurate pasture survey of the whole continent was made (Fig. 2b), which will be discussed later. So also, soils are of the greatest importance in deciding the details of settlement zones; but since the soils are themselves largely functions of the climate the latter remains the main control. It is the misfortune of Australia that her wettest areas are also her most rugged areas. Hence, in spite of the excellence of the climate in southeastern Australia—certainly one of the

most attractive in the world—there are large areas which are much too rugged for close settlement. No mention has been made of many other factors, such as shipping and railway facilities, convenient location of coal and metal mines, even of irrigation and artesian water. These play their part but are, perhaps, in the main, less fundamental than those earlier specified.

The Control by Structure and Geology

The structure, or build, of Australia is relatively simple, and a short study of the salient features will make the controls affecting settlement much easier to understand. In Figure 1 is given a "Mantle Map," in which the geological formations are shown laid one above the other in their true relation, though the edges of the formations, or "mantles," are necessarily exaggerated. In the west appears the great Australian Shield (1 on the map), an area of very ancient rock for the most part, which has resisted folding and was worn down nearly to sea level in Tertiary times. In late Tertiary times it was elevated *en masse* to an average height of about 1200 feet. It contains many valuable mineral deposits, notably the West Australian gold fields, but artesian water is absent except in one or two small basins on the margin. A great deal of the Shield has been covered (since the Tertiary) with sand dunes (9); but slightly wetter conditions of late have enabled scattered vegetation to "fix" these dunes. They are useless even for sparse grazing and obviously prevent prospecting for minerals.

Throughout most of the geological record the Shield has resisted the folding of the crust, which has been so characteristic of the margins of the Pacific. But the eastern margin of Australia has been buckled into ridges and hollows in several of the geological periods. Ignoring the older examples, in Permian times (about 150 million years ago) seas and lakes developed along a longitudinal hollow. In these lakes peat was deposited to form coal under the pressure of later formations. These Permian areas are shown as 5 on the "Mantle Map."

Somewhat later, in Jurassic and Cretaceous times, a great

elongated basin (geosyncline) developed just to the east of the Shield. In this basin were deposited porous sands, which were buried by several thousand feet of impermeable clays, etc. The whole series is labelled 6 in the map. The porous sands in the lowest layers contain the largest artesian water supply in the world. A smaller basin (7) of similar character developed on the north of the Great Australian Bight. Here

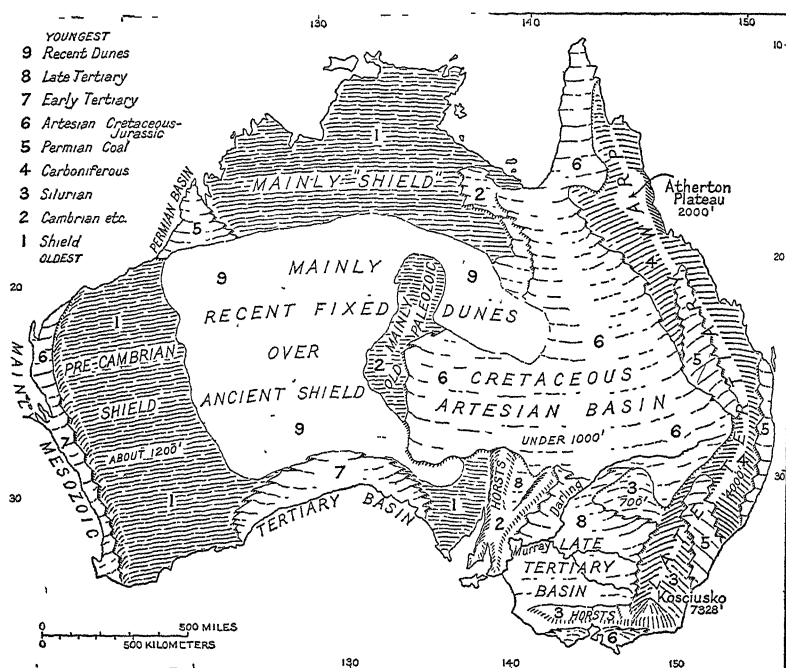


FIG. 1. Mantle map of Australia, in which the geological formations are shown in appropriate position (by exaggerating the edges). The main features of geology and topography are combined in a generalized fashion in this map.

also artesian water is obtainable, but of poor quality. To the south of the main artesian area is another broad basin covered with alluvial, etc., by the largest Australian rivers. This is the Tertiary Basin (8), drained by the Murray and its tributaries, the Darling, Lachlan, etc.

The most significant phenomenon in the evolution of Australia was one of the last. At the end of Tertiary times, probably before the Pleistocene (about one million years ago), the eastern margin of the continent was elevated in a broad earth

fold. This was parallel to and associated with the earth folds that produced New Zealand and the numerous "festoon islands" of the Southwestern Pacific. This upfold runs through Victoria, New South Wales, and Queensland and constitutes the Eastern Highlands. The highest point is Kosciusko (7328 feet) in the southeast corner of the continent. Only a few small areas in the south are above 4000 feet, and the average height of the fold ridge is perhaps about 2500 feet. There are many broad low gaps across it, but it is built up largely of old rocks, mainly Silurian (3), Devonian (4), and Carboniferous (4). Many metal mines have been developed in these old rocks of the Eastern Highlands.

Structure, in Australia as elsewhere, determines the geography of a region, as this brief discussion indicates. Metal mines are found in the old rocks exposed in the Shield and in the Eastern Highlands and in the allied late uplift forming the Flinders Range (2) in South Australia. However, they add only a small percentage to the population of "agricultural" Australia. Coal mines occur, not in these metalliferous formations, but in the Permian (5) and later rocks, such as those labelled 7 in Victoria. Artesian water occurs in still later formations (6, 7, and 8). Good soils tend to accumulate in basins and similar low areas (such as 6 and 8). Unfortunately, these are rather dry areas in Australia. Soils do not accumulate on elevated regions to any great depth, hence the Western Shield is only thinly covered except by wind-blown dunes. The rugged country in Australia is almost entirely confined to the region of late Tertiary uplift along the east coast or in South Australia. In the rest of Australia, broad basins or a level shield offer few difficulties due to topography.

Spread of Settlement after 1788

We may profitably consider the major phases in the gradual settlement of Australia before discussing the factors that will determine the sites occupied by future population. While it is erroneous to say that Captain Cook discovered Australia, it is not far wrong to say that his voyage in 1770 discovered "economic Australia." The Dutch, in earlier voyages, saw the unattractive tropical or arid coasts of the north and west, ex-

cept only in the small region around Perth. The "First Fleet," laden with convicts and their military guards, was ordered to land at Botany Bay because of the attractive description furnished by Captain Cook of that region. It is a curious coincidence that the original settlement in 1788 should have been near what may ultimately become the natural center of the population of Australia. I am tempted to place this in the lower Hunter Valley, near Newcastle, where valuable farm lands border on the richest coal field in the southern hemisphere (Fig. 4). Sydney itself is surrounded at a distance of 50 miles by a zone of deep gorges, carved in a sterile sandstone plateau, which is even today nearly uninhabited.

The early attempts of the settlers to grow wheat in a land with a rainfall of 50 inches and a hot, wet summer, or to develop a sheep industry in the same somewhat unfavorable region, were naturally not very successful. Yet up to 1860 a considerable proportion of the wheat in New South Wales and Victoria was grown in such unsuitable wet coastal regions (Fig. 3B). Now, hardly any wheat and few sheep are found in these regions. Until 1813 the infant settlement was hemmed in by the formidable "dissected plateau" referred to above. Flocks and herds thereafter moved west into the broad dry plains on the west of the divide—here about 80 miles from the Pacific (Fig. 1). In defiance of the military governors, who wished to keep the settlers within range of the garrisons, they spread far and wide over the western plains. The convicts helped to develop the country till 1832, but thereafter more and more immigrants arrived. Even in 1830 there were 39,000 immigrants and free men as compared with 30,000 convicts.

By 1840 the pastoralists had occupied large regions behind Sydney and smaller areas near Melbourne, Hobart, Adelaide, and Perth. A little later the splendid sheep country along "Mitchell's Line" (from Portland to Albury in Victoria) was taken up, and by 1860 the squatters (ranchers) had pushed up the Darling River to Bourke. In 1860-1870 occurred the greatest expansion of all—in Queensland—which is sometimes called the "Hegira" (Fig. 2a).

Meanwhile, in 1851 gold had been discovered in many parts

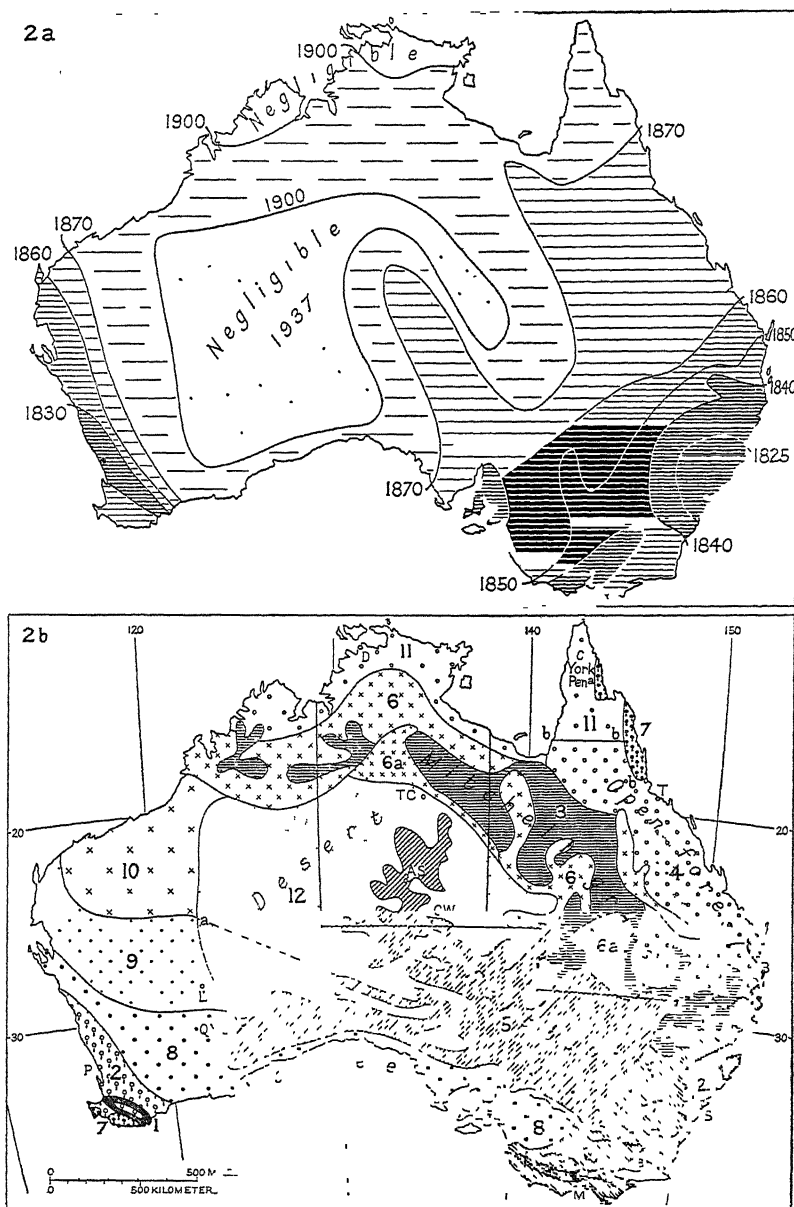


FIG. 2a. Generalized map of pastoral occupation. There has been very little new land occupied since 1890. (Mainly after S. H. Roberts.)

FIG. 2b. Map showing distribution of the chief types of pasture in Australia (based in part on McTaggart). Classes 1 to 12 are numbered in approximate order of value: 1, temperate grassland, with differentiation of important areas of exotic grasses (closer ruling); 2, temperate forest; 3, tropical Mitchell grass; 4, open tropical forest; 5, saltbush; 6, tropical sandy grassland, distinguishing as 6a areas in which acacia is more abundant; 7, rain forest; 8, mallee; 9, arid mulga; 10, west sandy grassland; 11, poor open forest; 12, fixed dunes; 13, alpine. (Courtesy of *The Geographical Review*.)

of southeastern Australia, notably near Bathurst (N.S.W.) and Ballarat (Vic.). In July of that year an aboriginal shepherd found a mass of pure gold weighing 60 pounds near Wellington (N.S.W.). In the next twenty years (1851-1871) twelve nuggets, each from one to three thousand ounces in weight, were dug up in Victoria. The effect of the gold discovery on the population may be gauged from the following figures:

Date.	1841	1850	1851	1852	1855	1858
Population (in thousands)	220	405	438	514	793	1051

A brief mention of other important gold rushes will show that Australia offered special incentives to new settlers for many decades. In Queensland, Gympie was started in 1867; and Mount Morgan, one of the world's great gold mines, in 1874. In Western Australia a striking series of gold fields, all of great value, was discovered: in 1886, Kimberley in the north; in 1887, Southern Cross (east of Perth); in 1888, Pilbara; in 1892, Coolgardie; in 1893, Kalgoorlie; in 1894, Kanowna; in 1895, Yalgoo. In the state of Western Australia population increased from 46,000 in 1890 to 171,000 in 1900, almost entirely as the result of the discoveries.

By 1870 all the important sheep country had been explored and in large part occupied. In the next two decades the remaining noteworthy stock-raising area was leased. This is the Beef-Cattle Belt (inset in Fig. 4) which extends across tropical Australia from Broome (W.A.) to Townsville (Q.). Since 1890 there has been little change in the distribution of cattle and sheep, though in many areas the density of stock has changed to a considerable degree as the following figures indicate for sheep (in millions):

	<i>New S. Wales</i>	<i>Vic.</i>	<i>Q</i>	<i>S Aus.</i>	<i>W. Aus.</i>	<i>Total</i>
1890	56	13	18	7	3	97
1930	53	16	23	6	10	108

The table shows very little change in the total for Australia, or in the figures for the states (except in Western Australia) in the last forty years. The same is true for cattle, which numbered 10 millions in 1890 and 12 millions in 1930.

We may conclude this section by a brief review of agricul-

tural development. Of the 22 million acres under crop in 1932 nearly 16 millions were devoted to wheat and 3 millions to hay. Moreover, the larger part of the latter acreage is for wheaten hay. Oats is the second crop, but it has only about two million acres of crop. Hence we can confine our attention to wheat in this brief survey. The essential features in the spread of the wheat belt are charted in Figure 3. In 1860 the areas cropped in the eastern fields were in general too wet for satisfactory wheat farms, and there has been a complete shift to

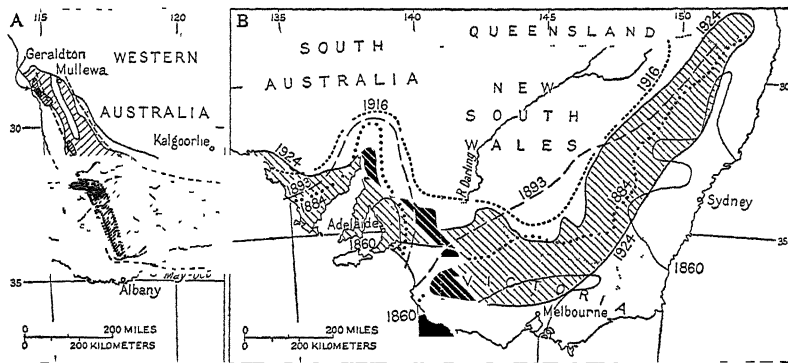


FIG. 3A. Spread of the wheat belt in Western Australia from 1888 to 1928. The isohyets for 9 inches and 15 inches (May-October) bound the actual wheat belt. (After R. P. Roberts and E. C. Clarke.)

FIG. 3B. Fluctuations in the wheat belt in southeastern Australia. The dotted areas were wheat lands in 1860, but most of this coastal land is not now used for wheat. The ruled area is the wheat belt in 1924. (Partly after S. H. Roberts.)

the drier slopes farther inland (Fig. 3B). The western edge of the wheat belt in 1884 is about the center of the wheat belt today. The advance still farther inland in 1893 and in 1916 is charted, as well as the present edge of the wheat, which has not varied greatly since 1924. Indeed, the fluctuations back and forth in the western boundary from 1893 to 1924 show that it is precarious to move farther into drier regions than the position reached in 1893 (Fig. 3B). Hence it seems evident that the position of the wheat belt in the southeast, where three-quarters of the crop is grown, is now fairly stationary. A further discussion of this margin of close settlement appears later.

An excellent summary of the chief factors influencing the growth of Australian population (taken from the Australian

journal *Inlander*) is given in the following table, with dates at which the population passed new "million marks:":

Date	Period in years	Population	Growth	Factors
1788-1834	46	100,000	Very slow	Convicts dominant
1835-1851	17	437,000	Very slow	Squatters; sheep
1852-1858	7	1,000,000	Rapid	Gold rushes
1859-1877	19	2,000,000	Slow	Farming with "selection"
1878-1889	12	3,000,000	Rapid	Approach of land boom
1890-1905	16	4,000,000	Slow	Droughts and slump; W. A. Gold
1906-1918	13	5,000,000	Rapid at first	Factories and the War
1919-1926	8	6,000,000	Rapid	Normal immigration, etc.

Character of the Australian Population

Before proceeding to consideration of the controls governing present and future settlement it will be well to discuss the character of the Australian population. In several particulars this is rather unlike that of most other recently settled areas. In the first place, the white folk have been free from the difficulties resulting from a large aboriginal population. The primitive tribes of Australia were so scattered, so few and so poorly endowed in culture, that they offered only a negligible opposition to the early ranchers and settlers. There have been numerous examples of minor conflict between white and black; but nothing resembling war or suggesting union of the aboriginal tribes against their displacers has ever occurred. Today there are about 60,000 full bloods and 20,000 half-castes in Australia. This is a negligible proportion. Moreover, the aborigines are almost all to be found along the relatively inaccessible northern coast lands, where they come in contact with only a few hundred whites.

Australia is perhaps unduly self-congratulatory on the fact that some 97 per cent of her white folk are of British ancestry. This is satisfactory in so far as it means that there is no language problem in Australia, such as vexes Canada or South Africa. From the racial point of view, Australia differs from Canada or the United States in that there are no immi-

grants from Central Europe. Hence there is lacking the broad-headed Alpine race, which is so well represented in America. The writer is of the opinion that biologically a strain of Alpine blood would strengthen the future Australian population. The British are themselves of mixed ancestry. Those from the rugged west of the British Isles are of Mediterranean race and are distinctly different from the fairer Nor-dics deriving from the eastern lowlands. There is some slight evidence that the darker Mediterraneans may acclimatize more readily in Australia than the fairer type.

The first large group of non-British immigrants to arrive were valuable German settlers, who took up land in the region north of Adelaide. They also migrated to the Wimmera and other places near the Murray River, and later many settled on the uplands west of Brisbane. Swedes and Danes helped the dairy industry in Victoria and the sugar industry on the northeast coast. To the French and Swiss we largely owe the wine industry, especially in South Australia and Victoria. The Italians have always been associated with sugar, and the first large groups went to the Lismore district, south of Brisbane. But of late years they have become a dominant factor in the cane fields of the far north, near Mourilyan (lat. 16 °S). Here they work under probably the hottest conditions experienced by European labor. Data from the 1933 census are not yet available, but in 1921 the population was made up as follows:

BIRTHPLACES OF POPULATION

Australia	4,581,000
Britain	676,000
New Zealand	38,000
China	13,800
Italy	4,903
Germany	3,555
U. S. A.	3,257
Greece	2,817
Japan	2,639
Russia	2,317
France	2,088

During the period 1921-1925 there was a net gain of 155,569 immigrants of British birth. Italians numbering 13,628 were the next in order of importance. In 1926-1930, the gain of British-born was 105,358; Italians, 10,583; Jugoslavs, 2,152. However, in the ten years quoted the total number of non-Europeans decreased by 981, the largest number of departures being Chinese.

The writer has always advocated such a modification of the White Australia Policy as would diminish the friction between Asia and Australia. (See pp. 338-341 in his book "Environment and Race.")² This would involve admitting small proportions of Japanese, Chinese, and Indians—but not enough to constitute a cultural menace. Since politicians have to a considerable degree dropped their references to the "unlimited potentialities of empty Australia" and have begun to admit that much of Australia is empty because neither British nor Asiatics could do much with it, there is likely to be less objection to the White Australia Policy on the part of foreign nations.

Present Population and Its Controls; Temperature

There can be no better guide to the future settlement of Australia than the present distribution of population. It must be understood that there is no unexplored territory in Australia. With such vast areas of uninhabited country it is obvious that detailed maps are not available, but no good stock country could have been missed by the later explorers since they were almost invariably on the lookout for new pastoral areas. By 1890 Australia ceased to be a pioneer country in the sense that good land awaited the discoverer. In the last half century the process of "filling in" and improving holdings already leased or purchased has replaced the pioneer's practice of "taking up" new country found by his own efforts.

The map shown in Figure 4 gives a good idea of the division of Australia into two regions, to which I have usually referred as "Economic Australia" and "Empty Australia." The latter (included in the area ABCD) is, unfortunately, the larger of the two divisions. It is amusing to relate that as late as 1924

² See Bibliography.

the writer was publicly censured in the Commonwealth Parliament for drawing attention to these grave disabilities. Today they are accepted without question in most quarters, as in the circular of the Bank of New South Wales on "Australia's Vast Empty Spaces."³ I know no better way of driving home

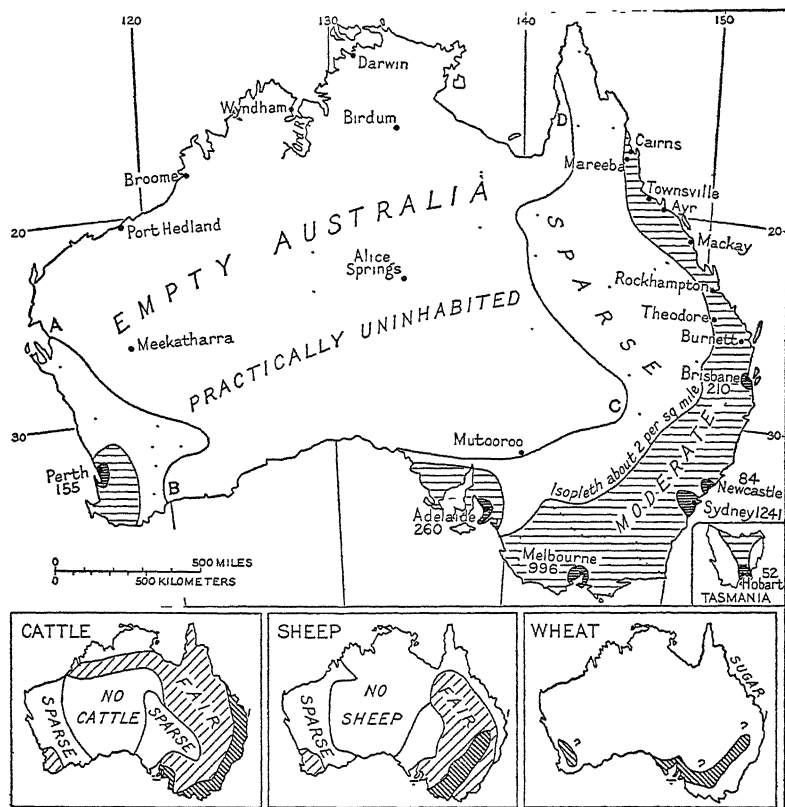


FIG. 4. Map of Australia showing distribution of population. *Urban* population is given in thousands; *moderate* is about four persons to the square mile; *sparse* is about one person to the square mile. Area ABCD contains about 15,000 settlers.

the fact of the absence of settlement in the center and north-west of Australia than to point out that only two regular routes—actually rough tracks, used by the Royal Mail once a week—cross this vast area. One runs from Birdum (south of Darwin) to the desert railway at Alice Springs; the other from near Port Hedland to the railhead at Meekatharra (Fig. 4),

³ See Bibliography.

Let us now examine with some care the climatic and other controls that have led to this very definite concentration of population in the east and south of Australia. In the first place, Australia is so situated that the Tropic of Capricorn runs across it at almost its widest extent. As a result (1) 40 per cent of the continent lies within the tropics—luckily in the healthier, because more arid, part of the tropical belt; (2) it lies in the region where the trade winds, blowing from the east, are dominant.

If we survey the world for lands similarly situated we find them, of course, in South Africa and South America, in North Africa and North America. (Only relatively small portions of Asia extend into the tropics.) Of these, only North Africa has a similar topography, with as great a breadth along the tropic; and accordingly, we find that the nearest parallel to Australia is to be found in the Sahara and the lands north and south of it. Fortunately, Australia is only 2400 miles wide along the tropic, instead of almost 8000 miles as is the case in the Old World. In both cases, the eastern coasts are wet because the trade winds blow onshore here, and the western coasts are desert because here the winds blow offshore. Thus, the attractive east coast of Australia corresponds to the south coast of China, while the arid west coast is a close homoclimate of the western Sahara.

The temperature map is given in Figure 5 at C. The average temperature of the whole continent is about 70° F. and thus is far higher than any of the former homelands of the Australians. Tasmania resembles France somewhat, but Melbourne and Sydney are homoclimates of Spain and Algeria or the Carolinas in the United States. The hottest part of Australia is not at Cape York, the district nearest the equator, but in Kimberley where the average for the year reaches the unusual figure of 85° F. This is partly due to the cooling effect of the trade winds on the east coast of Queensland and partly due to the hot northerly winds that blow in the summer down the west coast. Thus Marble Bar, near the tropic in Western Australia, has a record of 3½ months with the temperature rising to 110° practically every day. It will be granted, therefore, that the north coast, and especially the

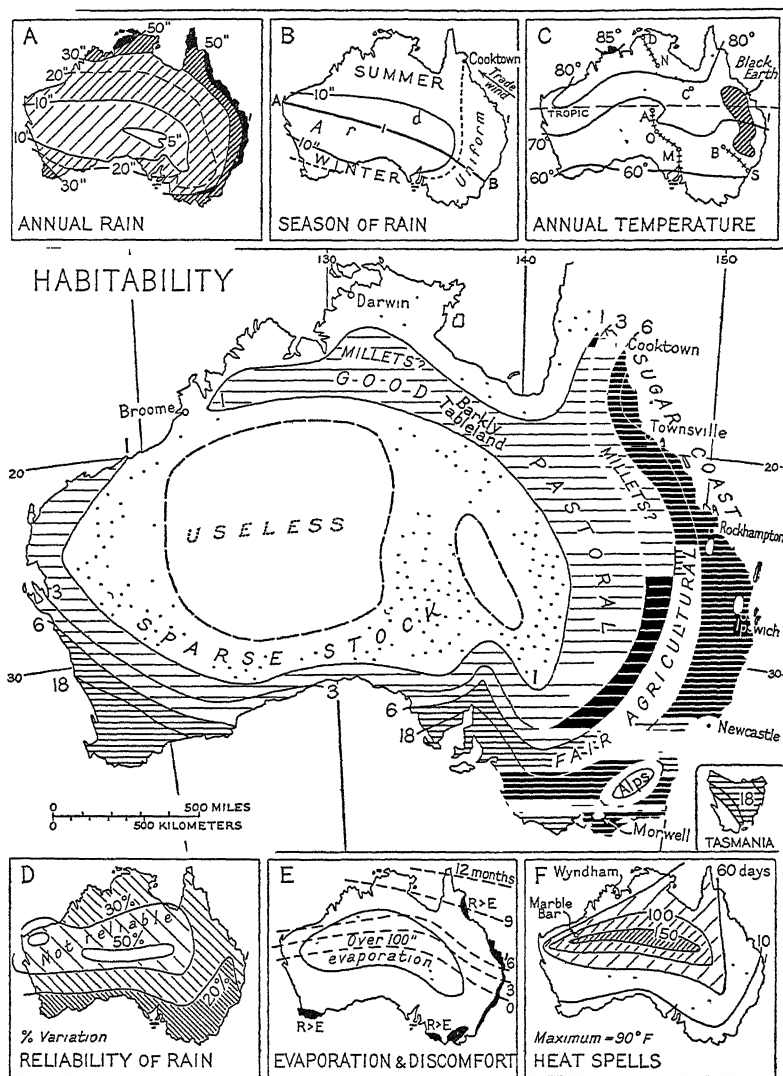


FIG. 5. Future settlement of Australia, showing approximate lines of equal population (to the square mile). *Small maps:* A, annual rainfall; B, seasonal rains (the line AB separates summer from winter rains); C, temperature (the suggested railway routes are indicated from Alice Springs [A] or Bourke [B] to Newcastle Waters [N], Marree [M]); D, rain reliability; E, evaporation and discomfort; F, regions experiencing long periods of heat (days over 90° F.).

northwest coast, has a temperature that offers little attraction to the average settler. The conditions in the southeast, on the other hand, are near the optimum as regards temperature. Snow never falls along the coast, though frost is not uncommon. The coldest month even in Melbourne is 48° F., so that plant growth continues throughout the winter. (The critical temperature for plants is about 42° F.)

The best test of the effect of temperature is shown in Figure 5 at E. Here the broken lines chart the number of months with a muggy climate, i.e. each with an average wet-bulb figure over 70° F. Thus Sydney has no such muggy month, Brisbane has three such months, Darwin nine, and Thursday Island twelve. In the writer's opinion this is the major climatic disability along the tropic coasts. It especially affects the white women, who are the most important individuals in any scheme of permanent tropical settlement. Another function of temperature—lengthy periods with the dry-bulb exceeding 90° F.—is charted in Figure 5 at F. These are called "heat spells" in Australia. They are most acute in the arid interior, where 150 such days have been recorded. But in the writer's opinion, the dry-bulb readings are not so important as the wet-bulb in discussions of settlement of tropical Australia, since the discomfort due to a hot moist climate is the more likely effect in lands where tropical agriculture may flourish.

Control by Rainfall

The rainfall regime is, however, the main control, as is indicated in the introductory paragraphs. Since Australia so badly needs water, it is rather surprising to find that the widest coast lands with a reasonably good rainfall (over 30 inches) are practically uninhabited. These districts are found along the north coast and are charted in Figure 5 at A. Reference to the second map (Fig. 5 at B) shows us that down the east coast the rain is uniform as well as moderately abundant, whereas along the north coast the rain falls almost wholly in the summer, and there is little or no rain for nine months in the year. No agriculture has so far been found to pay in Australia under these conditions; though, as we shall see,

this type of rain is found in Nigeria and allied areas with a considerable primitive population.

We owe to Köppen a method, now fairly generally adopted, of determining desert boundaries in terms of rainfall. If the region has a winter rain (as in the south of Australia) then we find the desert boundary where 19 cm. of rain falls. If it has a summer rain, then the boundary is where 39 cm. of rain falls. (In this case, the formula is Rainfall [in cm.] = Temperature [in °C.] + 14.) On the eastern edge, with fairly uniform rain, the rainfall on the desert edge gradually changes through 30 cm. to 25 cm. as the winter-rain region is approached. Thus, the lightly stippled area in Figure 5 at B agrees with desert conditions as defined by Köppen. This area of about 1,100,000 square miles is second only to Sahara (2,600,000 sq. miles) among the warm deserts of the world. Needless to say, it includes a considerable region where cattle and sheep are grazed successfully. Indeed, these animals originally lived in the arid regions of Central Asia, and in the Sahara itself there are large numbers of stock—though, like the human population, they are very scattered.

Two other aspects of climatic control merit brief attention. There are many ways of evaluating the reliability of rainfall. The simplest is to find the average value of the departures from the mean for a long period of years. With this criterion, we find that the southern regions of winter rain vary least from the average, i.e. are most reliable (Fig. 5 at D). The thunderstorm rains of the center are not only very slight but extremely variable. The summer rains of the north are to be placed between the other two types in this respect. We have no detailed information regarding evaporation. Obviously it depends on the temperature and on the dryness of the air. Hence, the lines of equal evaporation (Fig. 5 at E) are more or less parallel to the seacoast; but the greatest evaporation is found toward the hottest region in the northwest. In the center of Australia the rainfall is about 10 inches a year, but the evaporation is 100 inches a year. Only along the east and south coasts are there small areas where the rainfall is greater than the evaporation. These are shown as black patches in Figure 5 at E. Here, accordingly, in a relatively

humid atmosphere, vegetation flourishes with tropical abundance.

We have now considered the climatic controls, which are the most important since Australia is so flat that it is on the whole devoid of topographic difficulties. However, there are unfortunately some rugged regions where close settlement has not taken place in spite of an excellent climate. These are found on the seaward slopes of the highland region already charted in Figure 1. In earlier publications I have tabulated such areas in eastern New South Wales. Their total area is about 23,000 square miles—nearly 30 per cent of the well-watered littoral. In Victoria an approximate figure for the rugged highlands (with a wet but rather bleak climate) would be 11,000 square miles, or one-eighth of the whole state. In Tasmania about the same area is almost uninhabited, in spite of a heavy rainfall, owing to its rugged, bleak character. This is nearly half of the island state. In other parts of Australia topography is not a controlling factor.

Artesian water is present in many parts of Australia. Indeed, in the northeast we find an artesian basin, occupying over 600,000 square miles, which is the largest in the world. In general, all this water supply occurs in semiarid regions, where it is used for watering stock. It has, perhaps, doubled the grazing capacity of these areas but has had no effect on croplands and hence little effect on the population of the continent.

II

The Industrial Probabilities

It is not impossible to grade the lands of Australia so as to see which are most capable of supporting much larger populations and which have little hope of ever supporting a notable population. Such an attempt is illustrated in the large central map in Figure 5. It sums up the deductions derived from the data in earlier sections of this paper. These "zones of settlement" may be classified as Industrial, Agricultural (temperate and tropical), Dense Pastoral (sheep and dairy), Sparse Pastoral (sheep and beef cattle), and finally Desert

areas. It is much more difficult to estimate figures for the future populations in these zones.

The industrial possibilities depend almost entirely on coal. In Tasmania only is there a hydro-electric plant of note. The total energy produced by this type of power is only about one per cent of that generated from coal, and, though much more is available,⁴ it is quite negligible in view of the large coal resources of Australia. These are found mainly in three areas, which are all in the well-watered eastern region (see Fig. 5, center).

COAL RESOURCES OF AUSTRALIA

<i>Millions of Tons</i>	
Newcastle—Bulli region	120,000
Morwell Brown Coal (Vic.)	11,000
Ipswich, etc. (Q.)	2,000
	<hr/>
	133,000

The coal deposit south of Newcastle is the largest in the southern hemisphere. It is relatively accessible, and is probably the seventh largest field in the world, following not far behind Britain's enormous coal resources.

We may surely forecast a great development of manufactures, based on this cheap power in the basin that surrounds and underlies Sydney. The Morwell brown coal is now used to produce power which is carried to Melbourne and other centers of industry, but it is not an outstanding supply like that of Newcastle. Since the chief coalfields of Europe and the eastern United States have led to population densities exceeding 100 to the square mile, we may perhaps indicate three such future centers in eastern Australia at Newcastle, Morwell, and Ipswich.

The Future Croplands—Wheat

The agricultural lands of Australia are fairly clearly defined in the previous discussion. All along the east coast in the rather restricted plains and valleys are flourishing dairy regions. Maize and fruits flourish in the north, oats and various temperate fruits in the south. However, as noted, we have to

⁴Dresdner Bank Circular. See Bibliography.

subtract large areas of rugged country, totalling 45,000 square miles in the three southeastern states. In the map (Fig. 5) the Alpine region covered with snow part of the year is indicated, but rugged country extends to north and south of this area.

On the western slopes of the highlands, in the temperate (southern) portion, is the great Wheat Belt. It is also the great Sheep Belt. Indeed, the densest wheat production is probably somewhat farther west (in a drier belt) than is the densest sheep industry. The valuable paper by John Andrews (see Bibliography at end) has been used in the following section.

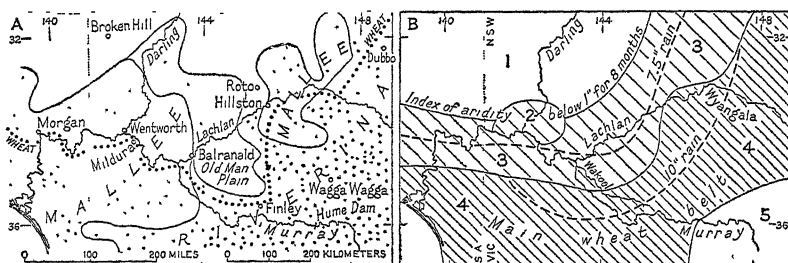


FIG. 6A. Edaphic control in the main wheat belt of Australia. The present inner (arid) edge of the wheat belt is shown by the broken line.

FIG. 6B. Subdivisions of the wheat belt. The broken lines show the rainfall in inches during the cool months (April-October). Most wheat of today is grown in region 4; region 3 is unreliable; region 5 too wet. (Both maps are based on John Andrews.)

The southeastern Wheat Belt contains 65 per cent of the crop lands of the continent. In addition to wheat only a small amount of alfalfa and oats is produced. The physical structure of the Wheat Belt has been referred to earlier in this article. It forms part of the great "geosyncline" in which deposition has been going on throughout later geological epochs. In late Tertiary times arid conditions led to the development of widespread dunes in the Mallee region, especially south of the middle Murray River (Fig. 6A). The rains have on the whole been better in recent millenniums, so that the dunes have been vegetated and river alluvium has spread widely over the erstwhile arid areas. It is in this setting that the wheat farms have developed.

There are marked edaphic features in this region which are to some extent independent of rainfall conditions. Thus

the arid edge of the Wheat Belt lies along the Murray River from Morgan east to its junction with the Murrumbidgee River near Balranald. The rain isopleths then run to the northeast, but the Wheat Belt makes a sharp turn to the southeast near Finley and thence goes to the north at Hillston (Fig. 6A). This marked bend is due to the unsuitable soils of the "Old Man Plain." To the west the Mallee type of soil and to the south the Riverina type are suitable for wheat. These three facies, so characteristic of the border country of wheat, may well be briefly described.

The Riverina type of country is typical savanna-woodland, with pine (*Callitris*) and box (*Eucalyptus hemiphloia*) as the chief trees. The soil is red-brown earth formed of sandy loam. Originally this country was used as large sheep stations (ranches), but since 1890 they have been cut up into sheep-wheat farms varying from 500 to 2000 acres each. With the use of superphosphate some farmers in this region can produce 40 bushels of wheat to the acre.

The Mallee type of country is named from the mallee, a typical eucalypt (*E. dumosa*), which produces an expanded rootstock, or shield, from which rise numerous slender trunks to a height of 15 feet or so. These mallees grow upon ancient sand dunes in the west, but the region near Hillston is flat. The soils are light red with much lime in the subsoils. Around 1890 the Mallee area in South Australia was cleared by "rolling down" the mallee clumps. By 1898 there were 60,000 people in the region south of Mildura, in what had often been called "desert." The area under wheat near Hillston, in New South Wales, soon amounted to 100,000 acres and represented the chief expansion in the state.

The boundary of the "safe zone for wheat" is the boundary of the savanna-woodland and red-brown soil region, while no successful farming has been carried on in the region of acacia-shrub and shrub-steppe. In South Australia this line has long been reached. In the east it is still on the arid side of the Wheat Belt. The 7.5-inch-winter-rain isopleth lies on this boundary and is thus a very important climatic and economic criterion (Fig. 6B). In the belt between the 7.5- and 10-inch isopleths, wheat can be grown successfully in "good years"—

but even here there are so many "bad years" that the economic position is doubtful.

Andrews divides this characteristic wheat area into four regions according to their possibilities of settlement (Fig. 6 at B). *Region 1* includes the northwest around the Darling River, where the rainfall is low (below 7.5 inches in the growing season) and erratic. The arid period is well above eight months in the year. Wheat has never been tried on these gray desert soils. *Region 2* (around Wentworth) is Mallee country akin to that in Victoria; and it was boomed in the "Million Farmers Scheme" of 1921, which the writer strongly opposed. The rainfall is low and variable, and there are no railways within 100 miles of Wentworth. It is clearly a very doubtful marginal area. *Region 3* includes most of the region where future considerable increase in wheat will take place. The reliability of rain is fair, and it is served by several railways.

The Roto area in the north has so far been reserved for stock, but it is said that there are 850,000 acres thereabouts where wheat may be grown. On the Lachlan River a large dam is being built near Wyangala, and when completed this may materially improve conditions near Roto and Hillston. Near Roto a farm of as much as 1600 acres is needed, so that the farmer may have 350 acres each in a rotation scheme of fallow-wheat-oats-pasture, with an additional 200 acres for horse paddocks, etc. For clearing and starting a Mallee farm, thirty shillings (seven dollars) an acre is needed besides outlay for machinery. The total capital outlay for such a farm would probably amount to £3780, or about \$18,000. Further figures show that only when the wheat price at country railway sidings rises above 3s. 6d. (84 cents) per bushel can the farmer receive a return on his investment. Of similar Mallee lands in northwestern Victoria, Professor Wadham says that even as 4s. 6d. (108 cents) per bushel it is no better than a doubtful proposition.

Region 4 (Fig. 6 B) is the main wheat belt of today. It has reliable winter rains, for the most part between 10 and 20 inches in the winter months. Present policy is to concentrate on this area and open no new farms in the debatable areas

2 and 3. By the use of superphosphate and by increasing water supplies for sheep in dams, etc., the better-class farmers are prospering in much of this region. The Wakool area is to be supplied with water (for sheep) from the huge Hume Dam on the Murray near Albury.

Region 5 (Fig. 6 B). This area receives 20 inches of rain during the growing period. It is rather rugged, and wheat is in places giving way to other crops and industries.

In the south of Europe such wheat country has more than 25 persons to the square mile. I have labeled it 18 in my tentative map (Fig. 5). In the smaller tropical area to the north, cotton and "Indian" types of wheat can be grown inland from Rockhampton, while sugar and tropical fruits (bananas, pine-apples, etc.) will no doubt spread along the coast in addition to the successful dairies.

The isolated wheat region of Western Australia is charted in Figure 3A, taken from a map by R. P. Roberts in Clarke's discussion of the water supply of this region. The gradual spread of wheat over the Shield, until the belt is nearly 200 miles wide, occurred between 1888 and 1928. It is remarkable that successful wheat can be grown in the shallow soils resulting from the decay of the ancient rocks of the Shield. Apparently the main rainfall criterion is that the rainfall in the growing season (May-October) shall be between nine and fifteen inches. These are plotted on the map.

The much advertised "Group Settlement Scheme" in the wetter southwest corner of Western Australia has cost nine million pounds since 1921. The result has been the establishment of about 1700 settlers on farms of low productive value. These areas were thought to be suitable for dairies, but the soils and pastures were not satisfactory, though the rainfall was adequate and fairly reliable.⁵

Settlement of the Australian Tropics, General Considerations

The total population in the tropics has not varied much for many years. If we assume that it amounts to 200,000 we shall not be far wrong. Of this meager number—only three per cent of the total Australian population—by far the larger

⁵ Bank of New South Wales circular. See Bibliography.

portion lives in Queensland. And of the remainder nearly half are to be found in the two small towns of Darwin and Broome (Fig. 4).

WHITE POPULATION OF TROPICAL AUSTRALIA

Rich east littoral of Queensland	130,000
Inland (pastoral) Queensland	50,000
N. Territory (Darwin, the capital)	2,500
N. Territory Pastoral	2,500
Western Australia (Broome, pearls)	2,500
Western Australia Pastoral	2,500
	<hr/>
	190,000

Why is the greater part of this population found along the so-called Sugar Coast? Not because of better transport or proximity to Sydney and Melbourne, but because the climatic and economic controls inexorably determine the distribution of population. Many people know that the Sugar Coast (from Rockhampton to Cooktown) is hot and wet; so, also, is the rest of the tropical littoral from Cooktown to Broome—and so they deduce that a population numbering many thousands will soon develop along most of our tropical shores. But a brief consideration of seasonal rains and of soils and pastures will soon enable the reader to see that there is a marked geographic boundary subdividing the tropics near Cooktown. (Fig. 5 at B.)

As regards rainfall, most of tropical Australia lies in the outer belt with seasonal rain. In the inner equatorial belt we find nearly uniform rains with a luxuriant forest vegetation. This forest can be cleared and will produce many crops provided soils and labor are satisfactory. But in the outer tropical belt (say from latitude 12° to 22°) the rain falls only in summer, and the rest of the year is marked by a persistent drought of some eight or nine months. Under such circumstances the natural vegetation usually exhibits xerophytic (arid) features—and this is certainly the case in the northern coast lands of Australia. Here, then, is another illustration of the value of trusting the natural vegetation as a clue to future development (Fig. 2b). It is true that there is a narrow strip of land in the Australian tropics that shows rain-forest

or jungle characteristics. This is found only along the east coast of Queensland, where the permanent onshore trade winds produce a nearly uniform rainfall. Here, and here alone, is sugar grown successfully. This belt of forest is extremely narrow and occurs only in patches along the coast. To the west it gives place to thick eucalyptus forest, and this in turn changes to open savanna-wood forest usually within twenty miles of the east coast. If we adopt as a rough criterion of a *uniform-rain* region the area that receives "one inch of rain in each of eight months of the year," then we obtain the isopleth bounding the heavily dotted area on the west in Figure 5 at B. It is clear that only one-seventh of the tropics falls into this category; and it is this one-seventh that contains most of the tropical population.

How do these conditions of heat and moisture affect the people in the Australian tropics? In general, it may be stated that the health of the population is good. There are only negligible numbers of aborigines (who are never careful in matters of hygiene and infection), and this is no doubt one good factor in the problem. Even the absence of cheap labor, which is available in most other similar tropical lands, while it prevents some economic development, probably works towards the health of the white resident, especially the women. It is found that moderate exercise is good for all settlers, and the white man almost invariably spends much time out of doors. The white woman necessarily leads a more active life in northern Australia, where it is very difficult to get domestic help, than, for instance, in the adjacent East Indies where domestic help is unlimited and cheap.

Two other factors, however, prevent our accepting these data as quite satisfactory. It is not difficult to show that the northern population has a larger proportion of young men and women than other parts of Australia. Sick folk and elderly folk tend to leave the tropics. Indeed, in the writer's experience almost all the women look forward to the time when they can return to the temperate southern lands. Thus the tropics has a "picked population," and, indeed, the only flourishing agriculture—the sugar industry—would cease at once if the high tariffs against foreign sugar were removed. Under

present somewhat artificial economic conditions we find a fairly prosperous agriculture (the sole example within a thousand miles of the equator) where the fieldwork is done entirely by European labor.

Possibilities of Tropical Agriculture

We owe to Wynne Williams⁶ a timely discussion of possibilities of the Australian tropics. He has been in a position to examine them closely both in Northern Territory and in Queensland, where he has held official positions connected with pioneer settlement for a quarter of a century. He has discussed at some length most of the coastal regions traversed on a journey northward from Brisbane.

Just south of the tropic is the government project at Theodore on the Dawson River. Here the total rainfall is 28 inches—and water from the Dawson was provided for about nine irrigations per year. In 1927, settlers were invited to make their homes in this "valley of content." Two hundred and sixty-four farms were occupied, but in 1935 only 124 settlers were living there, many of them in a state of poverty and discontent. It cost \$42,000 to place each settler! The failure was partly due to the subtropical rains flooding the irrigated areas.

In 1924 a rather ambitious scheme was put in operation near Rockhampton, in the Burnett district (Fig. 4). Here two million acres formerly used for grazing were made available for cotton and dairying. The annual rainfall is 27 inches. Two years of drought have occurred in the eleven years of settlement. At first 160 acres per farm was deemed sufficient, but later this had to be increased to 300 or 500 acres. The resumption and costs of roads, etc., have already cost the government about \$8000 per settler. Still, it seems likely that the scheme will be worth while in the long run in view of the value of the products. It is hoped that 7500 people will be settled on the area.

Even south of Rockhampton the pasture in summer becomes so dry that dairy cattle cannot be properly grazed. From Rockhampton to Townsville, a distance of 400 miles,

⁶ See Bibliography.

there are only two agricultural areas of consequence where irrigation is not necessary. One is at Mackay, where sugar and dairies occupy a rich district about 40 miles wide (Fig. 4). The other is at Proserpine, where there is another unirrigated sugar district. There are also two other agricultural districts mainly based on irrigation at Bowen and Ayr. In both cases water from shallow gravels is obtained by pumps and is used for the growing of cane. At Townsville, though it has 26,000 inhabitants, there is no important agriculture, for poor soils and a marked dry season prevent its development.

About 50 miles north of Townsville begins the largest area of true tropical forest in Australia. It is a narrow fringe extending for 240 miles along the coast to Cooktown. Here is the sole tropical tableland (Atherton Plateau) of any significance in Australia. Below the seaward scarp are the richest sugar plantations at Mourilyan, Cairns, and Innisfail. On the plateau (2000 feet high) were thick forests which have now in large part been cleared. Mareeba is the chief town on the plateau and is in the vicinity of many tin mines (Fig. 4). It is only 25 miles from the sea, yet already the rainfall has dropped to $2\frac{1}{2}$ inches in the three months of dry season. According to Williams, all attempts to produce profitable crops failed until tobacco was started, and the success of this crop is not yet assured. In the remaining northern portion of the tropics Williams corroborates the findings of the writer in 1918—that conditions are so much less favorable than on the east Queensland coast that it is foolish to attempt to settle farmers therein.

Williams points out that market gardens would probably pay if there were large mining populations in the vicinity. "Groundnuts, cowpeas and maize might be grown in the wet season for some milking cows; and temperate crops in the dry season with the aid of simple irrigation. Nevertheless not one of the mining centres of the tropics has left an agricultural settlement behind it." He finally adopts as a criterion of profitable agriculture the following standard: Farmlands must have a "dry season" less than ten per cent of the year. (By "dry season" he means months receiving less than one-tenth of an inch of rain.) Plotted on the map of the tropics, this includes

little beyond those patches along the coast from Rockhampton to Cooktown that were originally clothed in tropical rain forests. Here again we see the value of a scientific consideration of the natural vegetation.

As regards the drier hinterland of Queensland, the present writer is a little more optimistic than Mr. Williams. Considerable areas, with similar dry seasons, are able to support a noteworthy population at a relatively low scale of living in India and southeastern China. According to Prescott's map⁷ it contains the best black soils in Australia. We shall doubtless need much experimentation before we discover the best crops to use. I believe, however, that the future will see agriculture spreading through the belt labeled "Fair Agriculture" on the map (Fig. 5). Its future population is tentatively placed at from 6 to 18 to the square mile. Since the present population of this belt is only about two to the square mile, there is room for many more settlers in this area. In the southwestern corner of the continent (Swanland) the region of the future development of the Wheat Belt, near Norseman (Fig. 3A), is also labeled 6 to 18. Here the present population is almost negligible, for difficulties of soil, water supply, and poison plants still remain to be surmounted.

There is a sharp transition at the "6 isopleth" (in Fig. 5) from croplands to the purely pastoral country of today. In the United States (in cooler lands) this isopleth agrees with the 20-inch rain line, so that the Australian forecast represents a greater saturation than in the United States. I feel sure that in the hotter areas millets of the Nigerian or Sudan type can be grown, but there are no reliable data on this point. In homoclimes in North Africa the population varies from 2 to 25 to the square mile; and the same is true of the region in the hinterland of Rio de Janeiro with a somewhat similar environment. Dr. H. I. Jensen, an authority on Australian soils, describes the soils of the Northern Territory in the following terms: *Coastal soils* are fertile only in small alluviated pockets, which are subject to floods. In *hill country* a few patches have a better soil (brown loam) suited for tobacco. *Inland* the soils are often rich in plant food, but here there is not enough

⁷ See Bibliography, Taylor, 1932.

water for irrigation. Moreover, he thinks the proportion of alkali would tend to make the soil unsuitable for irrigation in the interior.

The Main Pastoral Belt

Most of Australia is a purely pastoral country, and here as in other arid countries the cattle and sheep need large areas per head for grazing purposes (see insets in Fig. 4). Moreover, water supplies are limited in the lengthy dry season that characterizes all the purely pastoral country.

The sheep population in Queensland has not increased more than ten per cent beyond the 1891 figure, in spite of nearly 45 years of closer settlement, improvement in watering facilities, and the building of railways to facilitate transfers of stock in drought years. Thus it is estimated that in Queensland, owing to drought from 1926 to 1932, there was a loss of 11,564,000 sheep.⁸

The experience at Mutooroo (a large sheep station in South Australia about 200 miles northeast of Adelaide) shows what can be done by enterprise and brains. In this area the rainfall is only seven inches a year (Fig. 4). It is fairly reliable and falls mainly in winter. The vegetation is largely saltbush (*Atriplex*), which sheep eat greedily (Fig. 2b). There are no rivers or artesian supplies; and an expenditure of \$500,000 was necessary to provide artificial water holes ("dams") and supply drains. This vast sum enables the owner to carry thirty-three sheep to the square mile. Thus, each sheep under such conditions needs 20 acres for its sustenance. Obviously this sort of expansion is beyond the powers of the ordinary settler and will not do much to increase the population of Australia. In the north of Western Australia are some of the largest ranches in the world. Thus Ord River Station formerly covered 4400 square miles and grazed 80,000 cattle. Yet this huge territory was managed by a white population of only forty people with the help of about seventy aborigines (Fig. 4).

In Australia cattle are found in the hotter, rougher lands, while sheep are in the cooler regions where water is more

⁸ Bank of New South Wales circular.

abundant (insets, Fig. 4). Cattle can graze ten miles from water, whereas sheep need a well or water hole within five miles. This factor has greatly influenced the character of settlement in many parts of the pastoral area. Sheep and wool have paid well in most recent years, but beef cattle have been for the most part a losing proposition ever since 1910.

The beef industry in the tropics labors under considerable climatic difficulties. Very soon after the end of the wet season the grasses dry off, and their nutritive value decreases rapidly. By the end of the dry season stock are generally in poor condition, tick fever weakens them still further, and the mortality is high, especially if the wet season is late. Under these circumstances cattle take a long time to mature, and this factor alone will prevent the far north of Australia from developing into a second Argentine in producing cattle for the chilled-beef trade.⁹

Hence there has been a shift from cattle to sheep where water can be obtained and where the country is not too rough, hot, or subject to pests like dingoes (wild dogs). Wynne Williams gives a valuable discussion of these problems in his paper on the Barkly Tableland, which is on the borders of Queensland and Northern Territory. Here is a strip of country about 500 miles long and 100 miles wide receiving from 15 to 20 inches of rain, where Mitchell grass grows abundantly (Fig. 2b). On the coastal side the rainfall is heavier, but the grasses are coarse and not nutritious. On the southern side the desert begins where the rainfall is less than 15 inches. There is little permanent water, but about 130 bores have been put down to a depth of 200 feet. Each of these costs several thousand dollars to equip, and each bore waters about 3000 cattle. Williams is of the opinion that it is possible to change over from cattle to sheep in most of this area. If this were done he thinks that four acres would support one sheep, assuming an adequate water supply were obtained (by bores to the ground water). He forecasts that three million sheep will be grazed on the tableland if his suggestions, involving large initial outlay of course, are followed.

Much of the region labelled "sparse stock" in the main

⁹ Bank of New South Wales circular.

map in Figure 5 may in the far distant future be developed in the same way as Mutooroo; but this cannot greatly increase the population and is only possible for settlers commanding large sums of money. As for the last areas, those labelled "useless" in the map, the writer is convinced that we have nothing to hope from them. The whole "arid" problem has been fully discussed in Chapter XXV of the writer's book "Environment and Race."¹⁰ These useless areas are mainly "fixed dunes" of no value for fodder and hiding the mineral resources that may underlie the dunes. In most cases there is no chance of underground water, and even if it be tapped there is no grazing for stock.

In the present article the writer is concerned primarily with the expansion of the present population by natural increase or by immigration. It is unnecessary to state that Australia has her unemployment problems like all other young countries. Hence the influx of immigrants in the future is likely to be a slower process than when large areas of first-class country were available. The cost of settling a farmer, as described in this article, must be borne in mind. Regarding settlement by peoples of lower standards of living, one can only state that there is nothing in the Australian climate to deter Asiatic or Central European immigrants. It is all a matter of standards of living. The Chinaman works a farm of 4 acres, the European one of 40 acres, the prairie farmer of Canada needs 400 acres. These aspects would seem to concern the sociologist and economist rather than the geographer.

The forecast made by the writer over twenty years ago is now generally accepted by Australians. It was to the effect that the future millions of Australia are going to find their dwelling places and occupations in the lands already known by 1865. The "Empty Lands" of Australia are a burden to the Commonwealth rather than an asset, and their "vast potentialities" exist only in the mind of the ignorant booster. Yet the six millions of Australia possess in the south and east of Australia one of the best areas in the world for white settlement. In this quarter of the continent the writer expects

¹⁰ See Bibliography.

that some twenty millions will dwell, when Australia is developed to the same extent as the United States.

If we adopt the lower standards of Central Europe and elsewhere, and assume that the coal is adequately used for manufactures, then there seems no good reason why this figure should not be doubled or trebled. As stated earlier in the paper, it is far easier to determine the relative order of the values of the settlement zones of Australia than it is to assign absolute figures to the population that may in the distant future inhabit these zones. The figures on the isopleths in Figure 5 are merely tentative; but the writer believes that the continent will "fill up" pretty closely along the lines suggested by these figures.

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POSSIBILITIES OF SETTLEMENT IN AFRICA

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AFRICA is one of the sparsely populated parts of the world and has an average population density of about 4.5 per square kilometer. It falls a long way behind Europe with about 50, and Asia with 22 per square kilometer; but only a little behind the whole of North America, with 7, in which Canada has a density of slightly more than 1 per square kilometer.

South America with less than 4 and Australia with 0.8 per square kilometer are more sparsely populated than Africa; but in the case of Australia the European population is over 6,000,000, and the aborigines number only some 60,000.

It is estimated that the total population of Africa is about 135 millions, of which Europeans number about 3 millions, 2 millions of whom are in the Union of South Africa; so that over the greater part of the continent the population density is affected only slightly by the presence of Europeans.

Various attempts have been made from time to time to estimate the potential "carrying capacity" of Africa, the estimated possible population of the continent varying from about 1,000 million to 2,000 millions. Fischer¹ estimates that the present population (135 millions) of the continent is only 8 per cent of its possible total (1,650 millions), the greatest increase being predicted for "Inner Africa" (roughly between the Sahara and Zambezi), where the natural conditions are thought to be capable of supporting a population of 1,500 millions, instead of the present total of 79 millions.

The low actual density, which has a strong bearing upon the possibilities of white colonization, is generally attributed

¹ A. Fischer: Zur Frage der Tragfähigkeit des Lebensraumes, *Zeitschr. für Geopolitik*, Vol. 2, 1925, pp. 762-779, 842-858.

to a number of factors, among which are the former intensive slave trade, the havoc still being wrought by various diseases, the decimation of groups of natives during intertribal warfare, combined with the low birth rate and the high infant mortality among the natives of the African tropics.

Increases and decreases within tribal groups are often due to movements of the male population to centers of labor, and the consequent breakdown of tribal standards of morality resulting from these long absences. With regard to the birth rate and the natural fertility of the tropical peoples little is definitely known; but some evidence in recent years seems to point to a low birth rate partly due to the long suckling period of about three years and to the rapid ageing of negro women under the strenuous conditions of land cultivation. In the Unyamwezi districts of Tanganyika Dr. O. Fischer reports an average birth rate per woman of 2.9, of which 1.5 die as infants.² Labouret³ gives the rate of 318 per 100 women among the Lobi of the western Sudan. In the Congo, Ryckmans reports birth rates of 2.45 per woman in the Madimbe Territory, and 3.80 in Chefferis Kehemba, with a markedly high survival rate among the Christian community of Madimbe.⁴

The rate of increase of the native population in these areas is thus low, and it is impossible to predict with any confidence the effect of future political and economic changes; but Ryckmans' report of a 41 per cent excess of births over deaths in the predominantly Christian community of Madimbe points to the probable effects of improved conditions of life.

The availability of native labor is one of the important factors influencing white settlement in tropical Africa, but this availability is not wholly dependent on increases in native population, although at the present time it is closely connected therewith. Both increase of native occupation of the soil and the possibility of non-native settlement depend more directly upon physical and biological factors of a different order.

² O. Fischer, in *Die Evangelischen Missionen*, 22, I, pp. 3 ff. (As quoted in D. Westermann: *The African Today*, London, 1934.)

³ Henri Labouret: *Les Tribus du Rameau Lobi*, Inst. d'Ethnologie, Paris, 1931.

⁴ Diedrich Westermann: *The African Today*, London, 1934, Ch. 13.

The Climatic Factors

Of the physical factors influencing settlement the most potent direct African controls are associated with water supply. With the exception of the Nile Basin and other smaller areas watered by allochthonous streams, like the middle course of the Orange River,⁵ settlement is possible on a considerable scale only under suitable rainfall conditions. In the small winter rainfall areas of the northwest and southwest of the continent, wheat production can be carried on with a well distributed annual rainfall of 7 or 8 inches; even 6 inches of winter rain well distributed, reliable, and of low intensity proves to be satisfactory for very "extensive" wheat cultivation in the Namaqualand district of the northwestern Cape Province of the Union.⁶ For most of the continent, however, the rainfall is predominantly of the summer type associated with thunderstorms and generally of high intensity, resulting, at the beginning of the season, in high surface flow and run-off and the washing away of surface soil. To determine a rainfall limit for human settlement of any type is, of course, quite impossible. Wherever springs occur, or underground water is available, settlement is possible. The writer is acquainted with one spot in the Tanqua Karroo of the Cape Province in an area having less than 5 inches of rainfall, where there is but one permanent spring for some two or three hundred square miles, and the water of this spring is highly impregnated with sulphureted hydrogen. But the little shack is close by, and the white residents complain of the "tastelessness" of ordinary drinking waters.

In considering the settlement and economic development of the great areas of tropical and subtropical Africa, one must bear in mind that local markets are scarce and crops must generally be such as will bear the cost of transport to the great world markets. Large-scale production of single crops, rather than mixed farming, is, therefore, generally imperative; and rainfall requirements have to be estimated on this

⁵ J. H. Wellington: The Middle Course of the Orange River, *South African Geogr. Journ.*, Vol. 16, 1933.

⁶ Departmental Committee on Wheat Growing, Cape Town, Report, 1919, pp. 15-17.

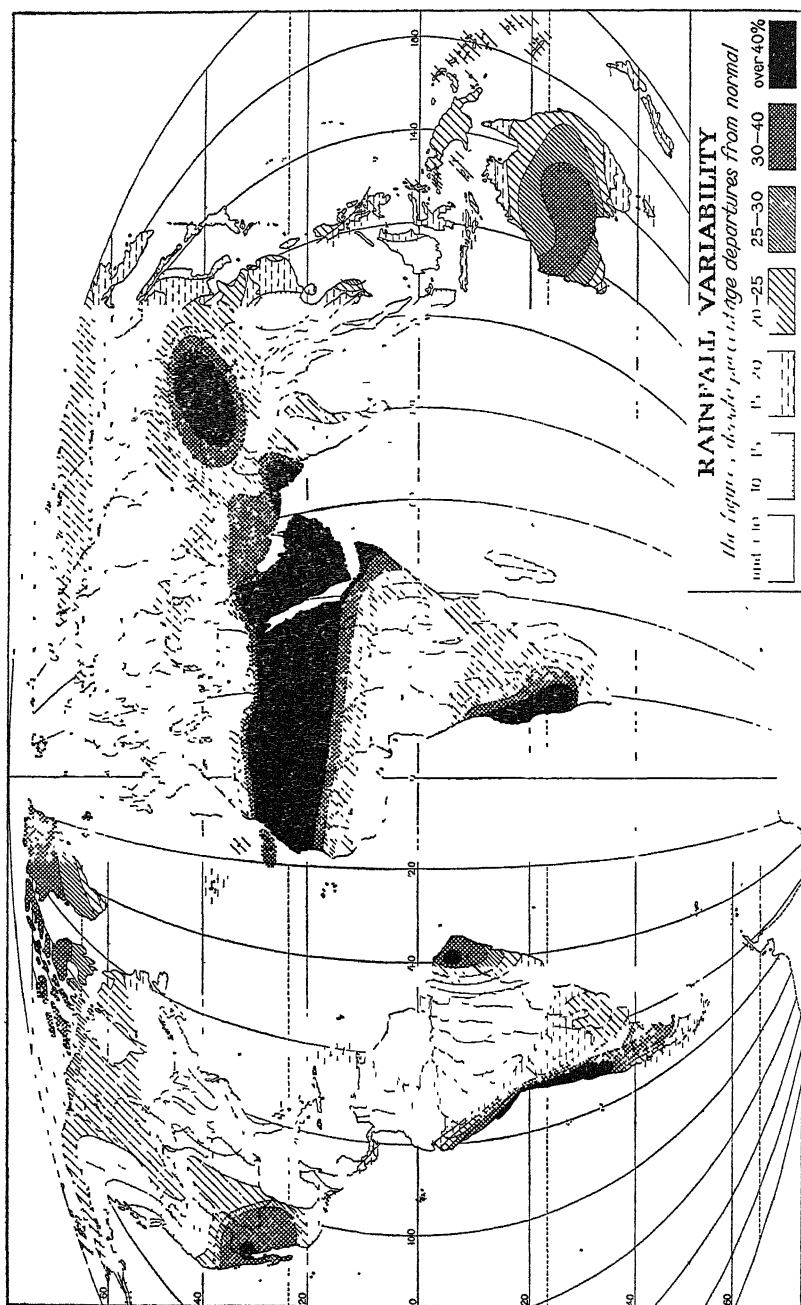


FIG. 1. World map of rainfall variability. (After Biel.) (From *The Pioneer Fringe*, by Isaiah Bowman; Amer. Geogr. Soc., New York.)

basis. For maize, one of the low-value crops, it is found that the lower limit for successful cultivation is about 20 inches in the Union of South Africa, 25 inches in Southern Rhodesia, and probably rather more for altitudes of between 4,000 and 5,000 feet in East Africa.

For plantations of coffee and tea higher rainfall is required, tea flourishing in Uganda with 50 inches of rain evenly distributed and in Nyasaland with about 50 to 80 inches. But of as great importance as the annual amount is the reliability of the rainfall, which as yet is imperfectly known over most of the continent. In the Union of South Africa a good deal of work has been done on the subject;⁷ but in most parts of the continent where the humidity is nearing the lower limit for cultivation reports of the unreliability of the rainfall are numerous, both in amount and in incidence, and the effect of this irregularity on crop yields is well illustrated by conditions in Southern Rhodesia.⁸

There are but few areas in Africa outside the Equatorial Climatic Region where the hazard of irregular rainfall is not a source of anxiety to the settler, so that a map showing the reliability of the rainfall for the continent would have special value in planning settlement. The only attempt up to the present to produce such a map is that of Biel (Fig. 1). Biel states⁹ that on account of the paucity of stations over most of the continent, and the short periods of most of the records available, the map can serve only as a first approximation and is bound to be greatly modified as longer records become available.

Another important aspect of rainfall in its relationship to settlement is the evaporation factor, which is primarily a function of the temperature and vapor pressure of the air. Evaporation records are not available for the greater part of the continent, but indications are not lacking that the

⁷ F. E. Plummer and H. D. Leppan: *Rainfall and Farming in the Transvaal, Transvaal Univ. College Bull. No. 12*, Pretoria, 1927.

S. P. Jackson: *Notes on the Climate of Johannesburg: Variability of Rainfall, South African Geogr. Journ.*, Vol. 17, 1934.

⁸ H. C. Darby: "Pioneer Problems in Rhodesia and Nyasaland", *Pioneer Settlement, Amer. Geogr. Soc. Special Publ. No. 14*, New York, 1932.

⁹ E. Biel. *Die Veränderlichkeit der Jahressumme des Niederschlages auf der Erde, Geogr. Jahresbericht aus Oesterreich*, Vol. 14-15, 1929, pp. 151-180.

evaporation monthly totals must be very high in the lower-lying areas of tropical Africa. Even so far south as the Orange River valley the annual totals from a free water surface

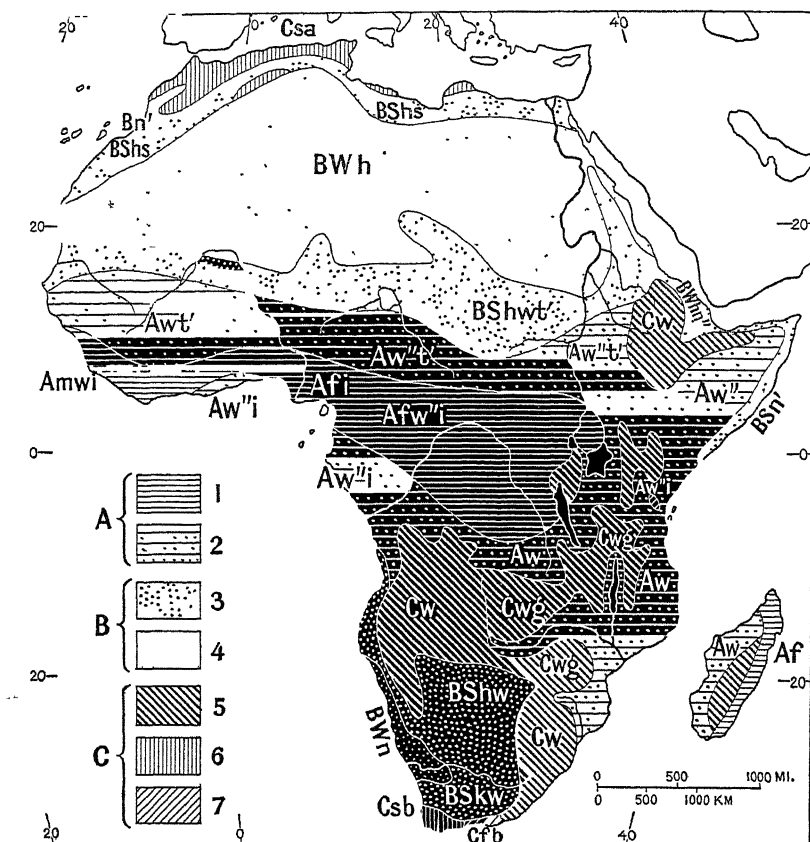


FIG. 2. Climatic regions of Africa. (After Koppen.) A. Tropical rain climates: 1, tropical rain forest with rain at all seasons; 2, tropical savanna climate with dry season. B. Dry climates: 3, steppe climate, 4, desert climate. C. Warm temperate rain climates: 5, with dry winter, 6, with dry summer, 7, with rain in all months.

reach 108 inches¹⁰ at an altitude of 3,000 feet, the evaporation being highest, naturally, in the summer months during the rainy season.

Rainfall and temperature may be regarded from another point of view as major factors in the production of a climatic type. Of the many classifications of climate, the one throw-

¹⁰ J. H. Wellington, *op. cit.*

ing most light on African conditions of settlement seems to be Köppen's. The climatic zones for Africa are shown in Figure 2. The "Desert" (BW) and the "Dry Steppe" (BS) zones can be regarded at once as zones of great difficulty which, except for irrigated areas, are of little account in considering settlement potentialities. The "Dry Steppe" is the millet and sorghum area of native cultivation and the home of nomadic herders.

The "Wet-Hot Forest Climate" of the equatorial zone is not the zone in which one may look for successful large-scale settlement of Europeans, except, perhaps, in parts of the Cameroon Highlands. The region is rather one in which an increase of native settlement can be expected on the basis of improved conditions of health and government. The only suitable immigrants would probably be from similar climates in the East Indies.

With the exception of the small Mediterranean areas, the remaining climatic regions are the "Savanna Climate" (Aw) and the "Warm Temperate Rain Climate" (Cw).

In contrast to the "Steppe Zone," the temperature conditions of the "Savanna Climate" are subject to no very strong fluctuations, although the diurnal and seasonal temperature variations and the low relative humidity of the dry season are favorable factors in comparison with the monotony of the "Equatorial Climatic Type." The region attains an altitude of about 5,000 feet near the equator. Most of the region receives a rainfall of more than 25 inches and consequently, on the rainfall basis, is a potential settlement area, except for parts of Somaliland and northeastern Kenya; but most of the northern part and considerable areas of the rest of the region have a tendency towards aridity because of high evaporation and belong, therefore, to the zone of difficulty in settlement based on crop production.

Excluding the "Mediterranean Zone," the region of Köppen's "Warm Temperate Rain Climate" comprises the coldest parts of Africa with a rainfall at all adequate for cultivation or for stock farming, and it seems to be the region most suited climatically for settlement by people of European stock. That does not mean that the region is not suited also

to other racial types. The negro (Bantu) is widespread over this region, although it is true that his density is in most parts very low. In Northern Rhodesia, for example, the land carries an average density of less than two natives to the square kilometer—"practically unoccupied," as General Smuts remarks.¹¹

In the Iringa district of Tanganyika the mean density is 3.7,¹² which, however, is offset by densities of more than 96 per square kilometer in parts of Kenya. On the basis of temperature and rainfall the region of the "Warm Temperate Rain Climate" is suited to European settlement, and over most of the region to the north of about 17° S. the native population is not at present sufficiently dense to constitute an effective occupation.

Temperature

In Africa, temperature conditions within the "Warm Temperate Climatic Region" vary more according to altitude than according to latitude. Pretoria (4,471 feet) has a mean annual temperature of 63.5° F.; Bulawayo (4,470 feet) 66.0°; Abercorn in Northern Rhodesia (5,100 feet) 67.3°; and Nairobi (5,450 feet) 63.2° F. There is thus not much to choose between these stations on the basis of the mean annual temperature, and each would seem to be equally favorable for Europeans. The effect of latitude expresses itself in the range between the warmest and coldest months, which is at Pretoria 20.0°; at Bulawayo 15.0°; at Abercorn 8.1°; and at Nairobi 6.7° F.

This raises the important question of the influence of seasonal change of temperature upon settlers of European stock. A considerable degree of variability is necessary for maximum vigor and energy. Monotony is physically and mentally depressing. It is in this character of the tropical highland climate that a doubt is felt as to the possibility of maintaining the vigor of the European stock. On the plateau of the Union of South Africa, where the maximum seasonal range

¹¹ J. C. Smuts: *Africa and Some World Problems*, Oxford, 1930, p. 56.

¹² C. Gillman: *A Population Map of Tanganyika*, Dar es Salaam, 1936, p. 4. *Idem*: *A Population Map of Tanganyika Territory*, *Geogr. Rev.*, Vol. 26, 1936, pp. 353-375.

is 32° F. (Prieska), the winter, with its frost period of more than 100 days, is sufficiently cold to maintain the vigor of the Europeans. Towards the equator winter temperatures gradually increase, until in Kenya at about 500 feet the coldest month is less than 7 degrees cooler than the hottest. The effects of this seasonal equability of temperature in the Tropical Highlands are not altogether counteracted by the relatively high diurnal range, and the opinion has often been expressed that, whilst the low night temperatures undoubtedly come as a welcome relief from the heat of the sun, the rapid daily change throws a sudden strain on the body which is avoided in the more gradual seasonal change in higher latitudes.

The intense insolation and the effect of altitude are other factors which have to be considered in planning settlement.^{12a} There is abundant evidence to show that they are apt to be sources of nervous and heart strain. But the Kenya settler points to the healthy and robust third generation of settlers' children and demands to know what ill effects climate and altitude have had on them.

In the Union of South Africa, however, there are grounds for thinking that the too genial climate of the lower-lying areas, coupled with the fact that the hard work is too often relegated to the native, has helped to undermine the virility of a section of the European stock and to produce a state of "poor whitism."¹³ These, however, are slow-working factors; and, although they are of capital importance in the scientific study of white settlement in the tropics, the evidence on the other side is also weighty, and the adaptability of human beings to a special climatic environment is still imperfectly known.

Biological Factors

Of more definite and decisive influence are the biological factors connected with the distribution of tropical diseases.

^{12a} A more detailed discussion of the effect of insolation and altitude will be presented to the Conference in the paper by Max Salvadori entitled "Quelques Considérations sur les Possibilités de Colonisation agricole Européenne sur les Hauts-Plateaux de l'Afrique Orientale." (Edit.)

¹³ The Poor White Problem in South Africa, Report of the Carnegie Commission, Stellenbosch, 1932.

Of these diseases the most important in considering settlement are malaria, yellow fever, trypanosomiasis, and dysentery. Malaria, which is said to be responsible for half of the deaths of the human race, is carried by anopheline mosquitoes, of which *Anopheles costalis* (*gambiae*) and *A. funestus* are the two chief vectors in the continent of Africa. The two specimens have different breeding grounds: *gambiae* using stagnant pools or swamps and, indeed, any hollow or receptacle containing rain water; *funestus*, on the other hand, using running streams. *Gambiae*, consequently, is more widespread but, except near sluggish streams, is limited to a great extent to the rainy seasons. *Funestus* is limited to the neighborhood of running streams but not by rainfall. Any practice that reduces the amount of standing water discourages, of course, the spread of *gambiae*. The cultivation of land in the Rongai Valley in Kenya, for example, is said to have had the effect of causing almost total disappearance of malaria in this locality.¹⁴

Temperature conditions also exercise a very close control over the breeding of these two species. In the Transvaal, for example, recent investigations by De Meillon¹⁵ show that *funestus* requires a mean monthly temperature of 61° F. or over, a range of temperature between the mean maximum of the hottest month and the mean minimum of the coldest of less than 40° F., and an annual rainfall of 30 inches or over. It has also been shown that in the Mazoe Valley of Southern Rhodesia the limiting minimum temperature at which *gambiae* breeds is about 51° F. in July, at an altitude of 1680 feet.¹⁶

The map (Fig. 3) showing the distribution of malaria in Africa leaves no room for doubt about the seriousness of this scourge; and, although in descriptions of settlement conditions in various parts of the continent prophylactic measures are generally assumed to be effective, the fact is that in

¹⁴ "Settlement in East Africa," Supplement to *East Africa*, Vol. 3, No. 146, 1927.

¹⁵ B. De Meillon: Observations on *Anopheles funestus* and *Anopheles gambiae* in the Transvaal, *Publications of the South African Institute for Medical Research*, Vol. 32, 1934, p. 206.

¹⁶ H. S. Leeson: Anopheline Mosquitos in Southern Rhodesia, 1926-1928 *Memoir Series*, London School of Hygiene and Tropical Medicine, No. 4, 1931, p. 28.

malarial areas the children lose energy and vitality not only in youth but in later life also.¹⁷ It is stated that in Southern Rhodesia half of the school children have had malaria¹⁸—a serious matter in view of the undoubtedly debilitating effect on the human body. Travellers and scientific workers may protect themselves against the disease, but in settlements it is almost impossible to protect children.

In the Transvaal and Zululand endemic malaria is limited to the lowlands below 2000 feet, but the summer incidence is felt up to over 4000 feet in appropriate thermal conditions. In Kenya the altitudinal limit is stated to be about 5000 feet.¹⁹ Within the tropics it seems probable that this altitude is about the upper limit of the disease.

Blackwater fever (an advanced and complicated form of malaria) occurs mainly in the low areas along the east coast, the Guinea coast, and in the low stream valleys of the Congo, the Nile, and the Niger basins, where the disease is serious.

Yellow fever, carried by aëdine mosquitoes, is widespread in the upper and lower Guinea coastal area and southward along the coast of Angola and South West Africa to about 20° S. Comparable with malaria in the seriousness of its effect on human settlement, is the disease known as trypanosomiasis, which is carried by various species of *Glossina*, commonly known as the tsetse fly. There are at least eight

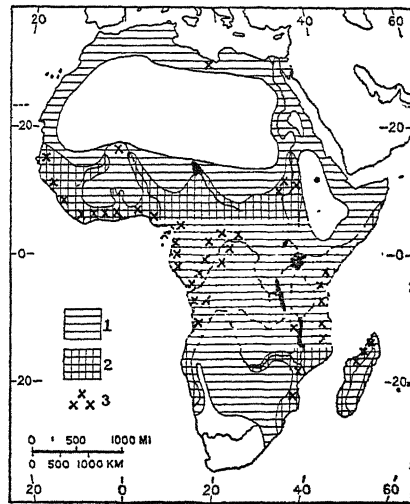


FIG. 3. Distribution of malaria and blackwater fever in Africa. 1, endemic malaria of mild form; 2, endemic malaria of severe form; 3, blackwater fever. (After Wutschke.)

¹⁷ The Poor White Problem in South Africa, *op. cit.*

¹⁸ H. C. Darby, *op. cit.*, p. 213.

¹⁹ Settlement in East Africa, *op. cit.*

species in Africa capable of carrying the trypanosomes, which cause sleeping sickness in human beings and nagana in animals. Human infection is caused by *Trypanosoma gambiense* and *T. rhodesiense*; nagana by *T. brucei*, *T. congolense*, and *T. vivax*.²⁰ Both the human and animal forms of trypanosomiasis are generally fatal, although a chronic form of sleeping sickness is found in West Africa.²¹

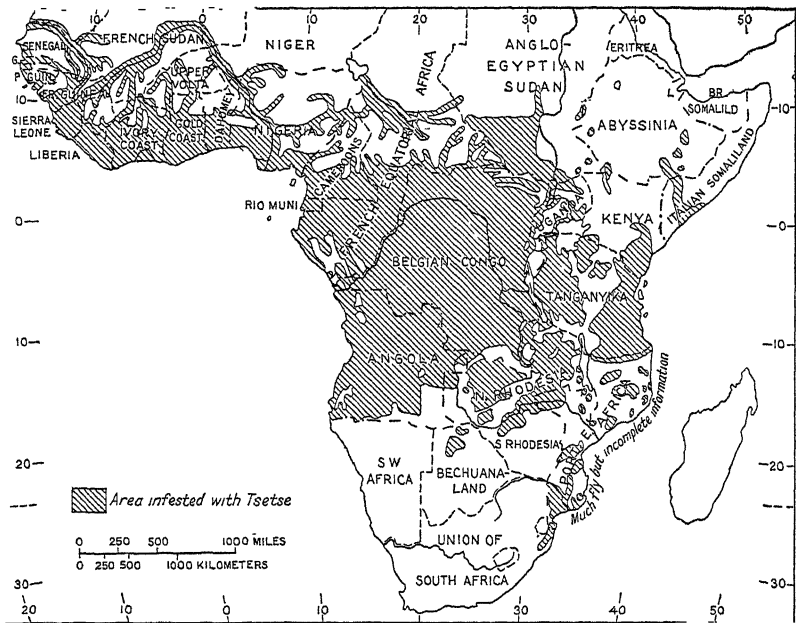


FIG. 4. Distribution of tsetse fly in Africa. (After Swynnerton.)

Of the eight species of *Glossina* responsible for the carrying of these diseases, *G. palpalis*, with its subspecies *fuscipes*, is largely responsible for the sleeping sickness and other forms of trypanosomiasis in Uganda and the Congo Basin: *G. morsitans* is the chief carrier of the Rhodesian and Nyasaland form of sleeping sickness. The distribution of these flies (Fig. 4) is so widespread over the continent that they form one of the most serious limitations to settlement, not only because of the threat to human health but also because of the

²⁰ Tsetse Fly Committee Report, Economic Advisory Council, London, 1933.

²¹ R. Newstead: Guide to the Study of Tsetse Flies, *Liverpool School of Tropical Medicine Memoir*, 1924.

impossibility of keeping domestic animals, for whilst wild game are apparently immune to trypanosomiasis it is pathogenic to domestic stock. In nagana areas, consequently, transport and plowing by animals is impossible, and cultivation must be by individual field labor. The disastrous character of sleeping sickness is shown by the outbreak in Uganda some thirty years ago, when 300,000 natives died of the disease.

If the present incidence of the disease is alarming, the outlook also is sufficiently disquieting.²² "All over Uganda, Tanganyika, Northern Rhodesia, and Nyasaland, fly areas are increasing, and are having a serious retarding effect upon the economic development of these territories."²³

The great hope for the future lies in the intensive study of the fly, which is being carried out at the present time in various places, notably in Tanganyika by the staff of the Tsetse Research Department. The recent report of the Director showing the admirable thoroughness with which the problem is being attacked certainly justifies the confidence that "we can add very greatly to the areas we have reclaimed already in Tanganyika."²⁴

Other hopeful signs are from Nigeria, where, in the Sherifuri area, the river banks have been cleared of *Glossina tachinoides* for a distance of 65 miles, and in the Bauchi Province considerable areas of good grazing land have been reclaimed by the extermination of *G. morsitans*, *G. tachinoides*, and *G. palpalis*.²⁵ Meanwhile, a few prophylactics have been found to be somewhat efficacious in the treatment of the disease, the most successful of which appear to be the drug Tryparsamide—an arsenical compound—and also "Bayer 205," or Germanin—a coal-tar derivative. In Tanganyika the effectual injection of tartar emetic has also been found to immunize cattle against nagana, provided that the injections are regularly maintained; but no method of permanent immunization has yet been discovered.

²² For further information relating to interdependence between fly density and human population density, see C. Gillman: A Population Map of Tanganyika Territory, *Geogr. Rev.*, Vol. 26, 1936, p. 354. (Edit.)

²³ Report of the East Africa Commission, Cmd. 2387, London, 1925; p. 72.

²⁴ C. F. M. Swynnerton: The Tsetse Flies of East Africa, *Trans. Royal Entomological Soc.*, Vol. 84, 1936; p. 510.

²⁵ Tsetse Fly Committee Report, *op. cit.*

Other tropical diseases are of lesser importance in their influence on the health and vigor of settlers, chiefly because they are more amenable to prophylactic measures than trypanosomiasis. Amoebic dysentery is widespread; its debilitating effects are well known and dreaded by white settlers in the tropics, but apparently hygienic habits and special care in the cleanliness of food preparation and in ensuring the

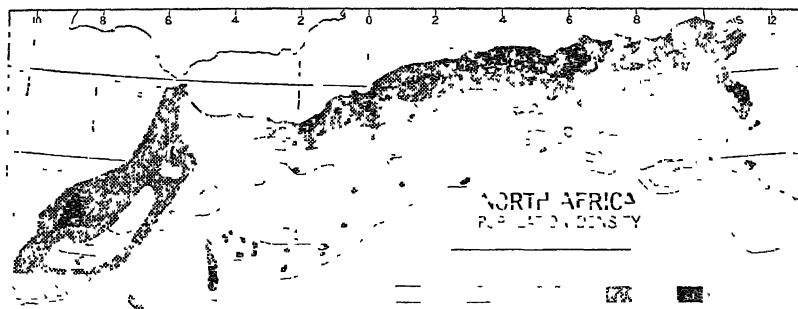


FIG. 5. Population distribution in North Africa (natives and Europeans). (From *Pioneer Settlement*, Amer. Geogr. Soc., New York.)

purity of drinking water go a long way towards minimizing the risk of infection. The difficulty at present is in getting native servants, and the natives on their own behalf, to appreciate the value of hygienic methods. With the development of European and other settlement, however, this disease seems likely to wane and ultimately to vanish. The climatic and health conditions may be thought of as basic or primary influences in the processes of African settlement; localized controls will now have to be considered with reference to the various political and economic regions of the continent.

North Africa

In North Africa, Egypt—with its rapidly increasing population—and Libya, costly to maintain, are not regions of considerable potential settlement. But in the Maghreb—as the Arabs call the Barbary States of Algeria, Tunisia, and Morocco—European settlement is in all stages of development. In Algeria it has been in progress for more than a century, in Tunisia for half a century, and in Morocco the process is in its first stages.

Two fairly well defined zones of human occupation of the soil can be recognized: a zone of cultivation where settlement is of the "sedentary" type, and a pastoral zone occupied more sparsely by nomadic Arab and Berber tribes. Settlement is most dense in the zone of cultivation (Fig. 5); native cultivators chose the mountain slopes and terraces for cultivation in preference to the low alluvial plains where malaria, heavy clay soils, and the liability to surprise attack outweigh for them the advantages of the valley floors.

Of the 12 million natives in the Maghreb, 8 million inhabit the mountain region of the Tell, whereas the 1 million Europeans are almost all in the valleys and plains of the Tell.²⁶

In Algeria the native population in 1856 was 2.3 millions and is now 5 millions; the European colonists in the same period have increased from 175,000 to the present total of 800,000.

There are no native reserves since the French policy is that of intermingling Europeans with natives, with the object of incorporating the native population into the body politic of the French Republic. In Algeria European colonists occupy 2.4 million hectares, of which 1.7 million have been settled as part of the official colonization scheme, and the rest acquired privately. The village system has been adopted widely as a means of consolidating the colonists and forming cultural centers, so that there are some 800 European villages, 70,000 landowners, and 300,000 agriculturists.²⁷ Most of the colonists derive from the southeast of France, from the Alps, and from Corsica.

In Tunisia, since 1880, the Algerian settlement policy of small holdings for immigrant families gave place to large estates like that of Enfida in the Sahel, between Tunis and Susa. The system of "métayage" developed, whereby native farmers cultivated the land for the proprietor company and received a proportion of the crops in return for their labor. By 1914, 2 million acres had been alienated to companies, and later attempts were made to encourage group settlement by the

²⁶ A. Bernard: "Rural Colonization in North Africa," *Pioneer Settlement, Amer. Geogr. Soc. Special Publ. No. 14*, New York, 1932. Most of this section is based on Bernard's paper.

²⁷ *Ibid.*

official colonization policy; but the best lands had been bought up by speculators, and at the present time the number of Europeans actually living on the land is small. The problem is somewhat complicated by the presence of 100,000 Italians, who form over 50 per cent of the population. About 650,000 hectares in Tunisia are in European hands, and, with the comparative failure of viticulture, settlement is dependent more upon wheat in the north and rice in the southern Sahel, between Susa and Sfax, and southwards towards Gabes.

In Morocco official colonization, which began in 1918, has not gone very far; the Tell has not yet been colonized to any considerable extent, and on the 700,000 hectares which have been alienated to Europeans only about 200 French families have been established. Projected irrigation works in the Sebou and Umm er Rbi'a valleys will open up another 51,000 hectares²⁸ for small holdings. According to Bernard,²⁹ in Algeria the limit of cultivation has been reached, if not exceeded; in Tunis the main developments appear to be in olive cultivation along the east coast. In Morocco, European colonization has only just begun, and the settlement of half a million European colonists during the next 50 years does not seem to be beyond the bounds of reasonable expectations.

In the southern territories of Algeria settlements are, of course, of the desert type, and no considerable extension of these can be expected in the near future.³⁰

Probably the key factor in the position in the Maghreb is the attitude of the native to the European. The system of forcible alienation of native land for European settlement has been tried and abandoned; its legacy is one of deep-seated ill will. At the present time the tendency in Algeria is for European land to decrease in area owing to repurchase by natives. In northern Tunisia the Islamic resentment at French attempts to gain control of the land belonging to the religious foundations has led to a government withdrawal and the inauguration of local native advisory and administrative councils. But the native still regards the land with a jealous eye,

²⁸ W. Fitzgerald: *Africa*, London, 1936, 2nd Edit., pp. 289 ff.

²⁹ A. Bernard, *op. cit.*

³⁰ F. Jaeger: Trockengrenzen in Algerien, *Petermanns Mitt. Ergänzungsheft* No. 223, 1936.

and the "latifundia" type of landholding is a constant source of irritation to him, as, indeed, it is also to the Bantu in other parts of the continent. To allow land to revert to native ownership is thought to be, however, "a return to barbarism." Native rights must be respected, but the opinion is held that "however great one may estimate the eventual increase of the native population to be, it is certainly possible for the Europeans to have a larger share in the exploitation of the soil."³¹

West and Central Africa

In the Western Sudan, French Equatorial Africa, and the Belgian Congo, settlement possibilities are very similar, being determined by the same set of geographical and economic controls, although the political attitude to settlement varies somewhat. In the Western Sudan the main geographical belts are climatic and are perhaps best reflected in the vegetation zones.

In the "Equatorial Forest Zone" of the Sudan there is no cultivation, and the economic life of the zone is centered round the oil palm, which, with groundnuts, provides the chief exported products. To the north of the Forest lies the Savanna, decreasing in density from the Equatorial type, near the Forest, to the northern Sudanese type. In this zone is most of the groundnut production, and the cotton grown by native cultivation. In the next zone, the Sahel, the Savanna becomes still thinner, the grass tufts more widely spaced, the trees of the thorny type. Acacias predominate, and the Baobab (*Adansonia digitata*) and the Doum Palm (*Hyphaene thebaïca*) are in association with *Combretums* and *Tamarix* on the fossil sand dunes. Here are the cattle, sheep, and goat areas; cotton is grown under irrigation and horse breeding carried on, for, except along the river course and along the coast, the tsetse fly is absent in the areas north of about 9° N.

In the sub-Saharan zone the vegetation is still more xerophitic: low, stunted, spiny bushes with sparse, tufted grasses, and great areas of moving sand dunes. Stream beds contain water only for a day or two after the summer storms; it is

³¹ A. Bernard, *op. cit.*

semi-desert, and very little human life exists here except the nomad Tuaregs and Arabs. The maximum temperatures of these zones and the humid heat of the coastal region effectively debar European settlement. South of 17° N. it is generally considered by the French that European settlement is impossible.³² Of the non-European population, the only considerable Caucasian element is the nomadic Fulah, who, probably on account of his mixture with the negro, is able to survive in these climatic conditions. On the Futa Jallon plateau, however, they find almost subalpine pastures, the most temperate of the climatic regions in the Sudan.

In the British protectorates and colonies the same attitude is adopted; the region is not one for white settlement; land is not alienated to non-Europeans. Both French and British colonial governments regard West Africa as suitable only for native occupation.

The economic development of West Africa can scarcely be envisaged as a project to be accomplished by means of new settlement. The introduction of laborers in 1881-1883 from China, and later in 1889 from Indo-China, was as unsuccessful as it was in the Congo. Climatically, Malaysia and the East Indies approximate to the Equatorial conditions, and parts of India to the Savanna zone, but there is no question as yet of introducing cultivators from these lands. Competition, however, in oil-palm products from Malaysia and the East Indies is becoming a serious threat to the industry in West Africa. The dense population of the East gives undoubted advantage to these areas, and it is possible that if efforts to increase the native population fail it may eventually become practical politics to introduce labor from the overcrowded East.

In French Equatorial Africa the outlook is even less promising. With an area of 2.25 million square kilometers, the total population in 1934 was 3.34 millions—the lowest density (1.48) per square kilometer in the nondesert regions of the continent.

The causes are somewhat similar to those in West Africa.

³² Henry Hubert: *Atlas des Colonies Françaises*, Paris, 1934; "Afrique occidentale Française," p. 20.

Sleeping sickness here in the last few years has become so severe that the 60 European doctors who have recently been commissioned to deal with the scourge may be said to carry the future of French Equatorial Africa in their hands. The disease has been spread greatly in recent years by methods designed to further the economic development of the country. The construction of roads, the Brazzaville-Pointe Noire Railway in the south, the conscription of labor for these and other lines of communication, the forced labor and portage of the concession companies, and the psychological depression resulting from these impositions have all contributed to the spreading of the disease and to the lessened resistance of the natives to its onslaught.

Here, as in West Africa, the underlying cause of physical degeneration is thought to be the famines and the "chronic starvation" that results from the disinclination to grow crops.³³ The enervating character of the climate is probably at the root of this disinclination; the native prefers to live on fish, roots, and the fruits of the forest rather than make the effort to cultivate crops. The death rate, even in villages where there is little or no sleeping sickness, is reported to be about 170 per 1000. Without doubt the concession system—or rather the oppressive character of the methods of exploitation used by the concession companies—is, to a great extent, responsible for a heavy toll in human life. One can only hope that the new concessions, granted on the expiry in 1929 of the old ones, will be more successful in helping to develop the human as well as the economic reserves of the colony.

Nowhere in Africa does the circle of disaster come full round so clearly as here. In a climate where human vitality is low and disease rampant, economic development, even on constructive lines, necessitates communications: roads and railways can be constructed under present conditions only by compulsory labor and the conscription of laborers from a distance. Compulsory labor, and absence from home, result in the breaking up of family life, the decay of morals, the lowering of the birth rate, and the rapid spread of disease

³³ R. L. Buell: *The Native Problem in Africa*, New York, 1928; Vol. II, p. 227.

from centers of infection. Rating the value of native life merely as potential labor, the whole purpose is thwarted if the native population dwindles, for white settlement here is impossible on any considerable scale. And even within the colony itself natives from the drier north find it impossible to survive long in the humid south. A death rate reported to be 600 per 1000 among the natives brought from the Lake Chad neighborhood to build the Brazzaville Railway, and the failure of Chinese labor, are evidence of some of the difficulties involved in transplanting human beings into the more humid parts of the colony.

The Cameroon and Adamaua highlands differ considerably from the general character of the lower Cameroon areas. It is generally agreed that the coastal region is not suitable for white settlement, but considerable areas of high grasslands are known to exist in the interior—above the tsetse-infested forest area—where cattle ranching may be possible. A prerequisite of such an industry, however, would be a railway to convey the cattle through the tsetse zone to the coast. Probably the best land and labor are to be found in the north, towards Lake Chad; but the interior of this region is still little known.

Belgian Congo

The Belgian Congo presents few problems that are essentially different from the foregoing. The usual tropical diseases are rampant here too, carried inland by the white man's transport. Sleeping sickness is again the greatest scourge. According to one authority,³⁴ eight- or nine-tenths of the population of the middle Congo has been destroyed by it.

The possibilities of settlement, however, are not associated with the basin itself, lying at altitudes of 400 to 500 meters, but with those parts of the highland rim rising to altitudes of more than 1500 meters (5000 feet), which is generally recognized in the Congo as the lowest limit of possible European settlement³⁵ (Fig. 6).

³⁴ Père le Grand, quoted in *La Question Sociale*, p. 52 (R. L. Buell, *op. cit.*, Vol. II, p. 574).

³⁵ See J. Legouis: The Problem of European Settlement in the Belgian Congo, *Intern. Labour Rev.*, Vol. 33, 1936, pp. 478-495. (Edit.)

The most favorable area from many points of view is Katanga, on account of the mines and their demand for food supplies. At the present time about three-quarters of the commodities imported into Katanga come from Rhodesia; there is a constant demand for local produce. In 1911 and 1912 Belgian settlers who had failed in cattle-ranching projects in Argentina were given free land and subsidies to settle in the Congo. The experiment, however, was a failure; the tsetse fly has here defeated the cattle farmer. At present the number of European farmers in the province is about 115.

In 1920 attention was directed to the highlands of the Province Orientale, in which it was ascertained that there are "vast areas habitable by whites," presaging "the establishment in the heart of Africa of numerous industries, and a highly important agricultural enterprise."³⁶ It is interesting to note the progress of settlement in these uplands of the Kibale-Ituri and Kivu regions in 1930.³⁷ The province has an area of 72 million hectares, i.e. 32 per cent of the whole Congo

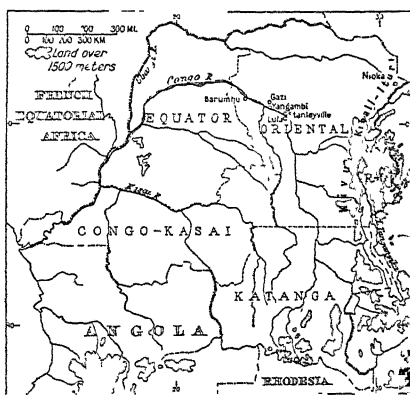


FIG. 6. The Congo Basin, showing land over 1500 meters (5000 feet). R-U, Ruanda-Urundi.

colony, and a native population of 3.95 millions, which is about 40 per cent of the whole native population. On the massifs of Ituri and Kivu there are considerable areas of habitable land at altitudes of over 2500 meters (8200 feet) which appear to be suitable for Europeans. By 1928 more than 4,000 Europeans had settled here, and the number of commercial, industrial, and agricultural establishments is given as 1,573.

The economic development of this province has certainly

³⁶ E. Laplaë: *La Situation de L'Agronomie au Congo Belge, Congo, Année 1, 1920*, p. 492.

³⁷ *Questions Économiques, Congo, Tome I, 1930*, pp. 63 ff.; *Tome II, 1934*, p. 408.

been astonishing. It produces 85 per cent of the cotton of Congo, 85 per cent of its coffee, 75 per cent of its ivory, all the gold, and 75 per cent of the rice. Almost all the Congo natives' cattle are here, numbering some 185,000 head. Government experimental and agricultural stations have been established at Yangambi-Gazi, Barumbu, Lula, and Nioka. Hevea rubber, cotton, cocoa, stock farming, and coffee seem to be the main agricultural trends. *Arabica* coffee appears to be doing especially well in the Ituri and Kivu highlands, and does not suffer from the Brazilian competition, like the *Robusta* type of the Stanleyville and Uele areas. The region seems to have considerable possibilities for European settlement, and of the commercial and agricultural industries in 1928 only about half were in Belgian hands.

The neighboring mandated province, Ruanda-Urundi, has meanwhile been receiving considerable attention from the Belgian administrative authorities. It is said to be a veritable "land of famines," the seasonal rainfall having "a hopeless irregularity,"³⁸ and that the only hope of prosperity for the dense native population is by the abandonment of cultivation of a seasonal character and by the maintenance of food reserves. The outlook and policy for European settlement for the Congo as a whole has recently been formulated in the "Report of the Commission for National Colonization in the Congo."³⁹ The report states that "the Belgian Congo as a whole is not a colony of settlement, at least in its present state. Up to the present there is no place in any of the regions of the Congo for the small peasant class without native labor, nor for any immigration on a large scale. The obstacles are of a sanitary, economic, and demographic character." The Commission is of the opinion that the Congo is a "Colonie d'encadrement," that means of accommodation to climatic conditions is scarcely accessible to colonists of slender resources, and that it is only possible for others of more ample resources in a few relatively small areas in the Congo basin. Immigrants, however, are needed, provided they have pro-

³⁸ La situation actuelle dans le Ruanda-Urundi, *Congo*, Tome I, 1929, pp. 819 ff.

³⁹ V. Gelders and A. Marzorati: La colonisation nationale du Congo belge, *Congo*, Tome II, 1936, pp. 198-209.

fessions or trades or if they are artisans or miners. Agriculture, the report states, is advisable only in intensive plantations, although mixed farming is possible near urban and mining centers.

East Africa

If the outlook for European settlement in West Africa is discouraging, the prospects in East Africa are "shot through" with possibilities. As in Ituri and Kivu, the highlands of Equatorial Africa have climatic zones that are, on the whole, healthful for people of the temperate zone. The extent of this warm temperate climate has already been considered (pp. 235-6); it is generally associated with altitudes of over 5000 feet. In Kenya 4000 feet is sometimes given as the proper limit of European settlement, but the more generally accepted altitude is 5000 feet, provided it be understood that the contour cannot rigidly demarcate land suitable or not suitable for land settlement and that here and there areas lying outside of this limit have special local conditions favorable for Europeans.⁴⁰

Because of the imperfectly known conditions and the imminence of a land survey, it is perhaps unwise to speculate about the settlement possibilities in Abyssinia, but there is little doubt that most of the plateau surface will be found to be suitable for European settlement.⁴¹ In parts of Kenya and Tanganyika, however, the conditions are well known, and some estimate of future development can be attempted. The areas over 5000 feet in altitude are shown in Figure 7 and the land alienated to Europeans in Figure 8. In Kenya, out of a total area of 245,060 square miles, 12,750 square miles have been recognized by the Kenya Land Commission⁴² as "European Highlands," and almost all of this land has been alienated, the approximate number of landowners being 1,800. About 6 per cent of this land is cultivated; the rest is either pasture land or is unused. Many of the large estates are now

⁴⁰ Report of Kenya Land Commission, Cmd. 4556, London, 1933, p. 486.

⁴¹ See T. H. Thomas: Modern Abyssinia, A Selected Geographical Bibliography, *Geogr. Rev.*, Vol. 27, 1937, p. 126. For further valuable information see Leo Waibel: Die Rohstoffgebiete des Tropischen Afrika, Leipzig, 1937, pp. 241-265. (Edit.)

⁴² Report of Kenya Land Commission, *op. cit.*, p. 491.

being split up, and the new settler has little option but to buy land in the open market.

With regard to the effect of climate upon settlement,⁴³ there are many opinions based on experience. The personal element must, of course, loom large in opinions given by settlers. One settler told the writer that for some years whilst he was suffering from amoebic dysentery (a common disease

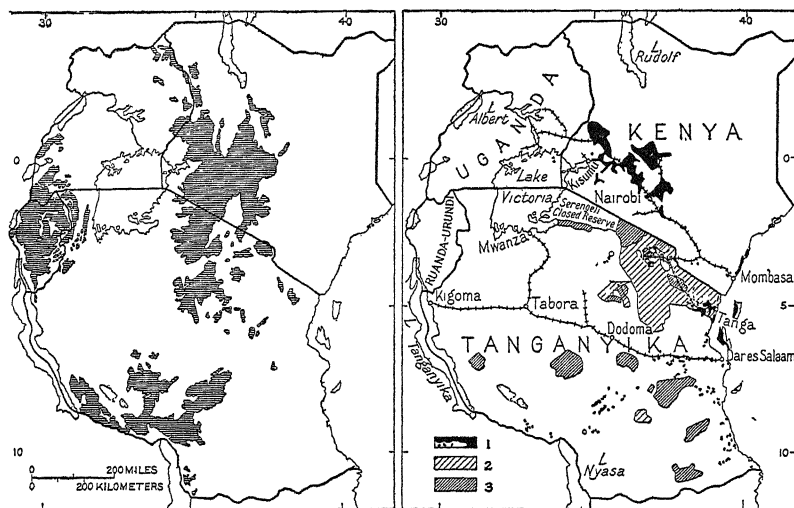


FIG. 7 (left). Kenya and Tanganyika, showing land over 1500 meters (5000 feet).
FIG. 8 (right). Kenya and Tanganyika, showing: 1, European settlement areas; 2, areas closed to settlement; 3, game preserves.

in Kenya) he felt convinced that the climate was a treacherous menace to the constitutional stamina of Europeans. With the mastery of the dysentery his outlook on the climate changed, and he feels now that it is one of the best in the world. Certainly the sun must be treated with respect, but, as we have seen (p. 237), the temperatures are moderate; the rest and stimulus brought by the seasonal changes of the temperate zone are lacking.

Reference has often been made to nervous strain resulting from either the climate or the high altitude. That nervous strain is apt to occur is generally agreed, but that it is climatic

⁴³ See A. Walter: *Climate and White Settlement in the East African Highlands*, *East African Medical Journ.*, Vol. 11, 1934, pp. 210-225. (Edit.)

or altitudinal is open to doubt. Not only the settlers in Kenya, but recently a German observer in Tanganyika,⁴⁴ have expressed the opinion that it is generally connected with the anxiety attendant upon pioneer settlement under difficult conditions; and probably the "climate of loneliness" may often have a good deal to do with these neurasthenic disturbances. Certainly the third generation of Europeans in Kenya shows no apparent physical deterioration. The experiment seems to be successful in this respect, and there appears to be no reason to discourage settlement in Kenya on grounds of health, if the settlers have strong hearts.

Of more immediate and direct effect upon the success of settlement in East Africa is the geographical position and its economic results. With the exception of coffee, the chief products of Kenya are commodities that are of low value in relation to bulk. To the relatively high cost of production must be added freightage to the distant world markets; and the doubt arises whether a prosperous European community can be built up on the basis of coffee, sisal, and maize production. Already it has been found in Tanganyika that *Arabica* coffee produced by natives in the Arusha district has obtained higher prices than that grown on the Europeans' plantations,⁴⁵ and the restriction of coffee growing in Kenya to European cultivation has been keenly resented by the native cultivators who, of course, can produce it at a much lower cost than Europeans. Recently (1933), however, native coffee growing has been started in the districts of Embu and Meru, far from the European plantations, and the position is that "Africans are now being encouraged to grow it in small experimental blocks under license and strict supervision in well defined areas."⁴⁶ The reasons given for the restriction of native coffee production are based on the fear that the native will not be able to keep his plantation disease-free, but the fear is deeper seated and lies at the root of what is, perhaps, the greatest problem in African settlement.

⁴⁴ Carl Troll: *Das Deutsche Kolonialproblem, auf Grund einer ostafrikanischen Forschungsreise 1933-34*, Berlin, 1935, p. 56.

⁴⁵ R. L. Buell, *op. cit.*; Vol. I, p. 494.

⁴⁶ Colonial Reports: No. 1771, Kenya Colony and Protectorate, London, 1935, p. 13.

In tropical Africa the prosperity of the white colonists depends ultimately on native labor, and it is stated that when settlement in Kenya began in 1903 settlers were encouraged to come on the understanding that in addition to suitable land there would be a plentiful supply of cheap labor. The capital expected of a settler was £5,000, and the type of man encouraged to settle was not the laborer type at all. After a period of compulsion or semicompulsion of the natives to work in the European plantations, the government and the public in England have gradually swung round to the opinion that the welfare of the native people is a moral obligation of the white rulers, and that exploitation of native labor at the expense of native welfare must stop.

The settlers' point of view is that settlement is impossible without native labor, that in any case the native man is lazy, farming by means of his wives rather than with the sweat of his own brow, and that it is for his own good that he should learn from the Europeans. Governor Sir Edward Grigg is reported to have said that the best training for the native is work on a well-run European estate. Opponents of this policy point to the economic success of cotton production in Uganda and in West Africa, with no European estates as training-ground, and label this apparent altruism of making the native work "for his own good" as rank hypocrisy. In the meantime, the number of native men who work continuously on the European estates has been increasing, from 90,000 in 1920 to 185,000 in 1927, i.e. 34 per cent of the total number of available men between 15 and 40 years of age and "60 per cent of the adult men of the most intelligent tribes."⁴⁷ During the years of trade depression the number employed has decreased considerably, but in 1933 the total number of natives employed was 141,000.

The influences of this absence from the native's own land, community, and family have been stressed very frequently by missionaries and others. In addition to the breaking up of family and tribal life and its resulting moral upheaval, the movement of laborers is said to be spreading malaria, spirillar

⁴⁷ R. L. Buell, *op. cit.*, p. 397.

fever, and venereal disease. Moreover, the labor of cultivating the native lands has fallen more on the women and girls, who are feeling the strain. The native's resentment is further aroused by the spectacle of so much of the European land lying unused, whilst he himself is limited to reserves to which the density (in the Kikuyu Reserve) reaches 250 to the square mile. Whilst the relationship between individual settlers and individual natives is in most cases cordial, there is strong feeling among the natives against the taxes that force them to go to work and against a system that is disruptive of tribal life and well-being.

Suggestions have been made that the European settler abandon the "overseer" attitude and labor himself, as the British sugar growers are doing in Queensland, Australia, where the heat is as great as in Kenya.

Wheat and dairy farming on the basis of smaller holdings and European labor have been suggested by Sir Edward Grigg⁴⁸ to make the settler "largely independent of the labor supply." The suggestion is attractive, but in comparison with Australia or even South Africa the situation is complicated. In the Union of South Africa the native outnumbers the white man by 3 to 1. In East Africa, as a whole, the European is outnumbered by nearly 400 to 1, and the threat of ultimate inability to survive as a small isolated community is a constant fear, albeit suppressed, in the mind of the settler. Will a "poor-white problem" arise in East Africa? Even now some of the outlying European settler communities are falling behind in education,⁴⁹ and the occasional failure of some of the smaller farmers is inevitable. Moreover, the social problem is complicated further by the presence of 300,000 Indians, who carry on most of the trade of the colony.

The position is at present that the British government has declared that it will maintain "the dual policy" of regarding native interests in East Africa as paramount and that the interests of the European settlers will be furthered in so far as they are in harmony with the measures taken to ensure

⁴⁸ *East Africa Standard*, Jan. 1, 1927, p. 35. (Quoted in Buell, *op. cit.*, Vol. I, pp. 347-348.)

⁴⁹ *African World*, Vol. 97, 1926 (Dec. 18), p. 344.

the development of the native people. Many settlers feel that the importance of their position lies in the "strong settlement" policy of encouraging more and more European immigrants. Others think that the labor shortage will become more acute unless a halt is called. Certainly the situation requires the utmost caution. East Africa needs the outpost of European civilization; but whether this community can be greatly increased on its present basis of native labor, without detriment to the native peoples, is extremely doubtful.

In Tanganyika the general situation has much in common with that of Kenya, but there are important differences. The main considerations here are water supply, trypanosomiasis, and the government settlement policy. Although the mean annual rainfall is not always a reliable indication of effective humidity in an economic or human sense, in the absence of more detailed knowledge it is a useful indication. The rainfall distribution has the usual low reliability of tropical regions in Africa and the high intensity that is responsible here, as in other parts of the continent, for removing the surface soil. It is estimated that 555,000 out of a total area of 887,000 square kilometers, or nearly two thirds of the country, are uninhabited on account of an insufficiency of water⁵⁰ (Fig. 9). It is possible that parts of this area will become habitable if water can be found by boring, but this possibility is not one that affects the prosperity of settlement in the near future.⁵¹

It is generally recognized in Tanganyika, as in Kenya, that the areas suitable for European settlement lie at altitudes between 5000 and 10,000 feet above sea level, although a warning about nervous strain at high altitudes is officially given.

Of these areas (Fig. 8), the Northern Usambara-Kilimanjaro-Meru area has, of course, long been settled by Euro-

⁵⁰ Clement Gillman: A Population Map of Tanganyika, Dar es Salaam, 1936, Table III, p. 7, and map showing types of land occupation.

⁵¹ *Idem*: A Population Map of Tanganyika Territory, *Geogr. Rev.*, Vol. 26, 1936, pp. 353-375, Table I, p. 357.

⁵² The relation between water supply and utilization of natural resources in the Northern Province of Tanganyika Territory has been discussed by E. O. Teale and C. Gillman: Report on the Investigation of the Proper Control of Water and the Re-organization of Water Boards in the Northern Province of Tanganyika Territory, November-December, 1934, Dar es Salaam, 1935. See also: Water-Supply Problems in East Africa, *Geogr. Rev.*, Vol. 26, 1936, pp. 503-504. (Edit.)

pean and native planters, and in view of possible native developments no further alienations are allowed in this zone. An exception occurred in 1935, however, when the "right of

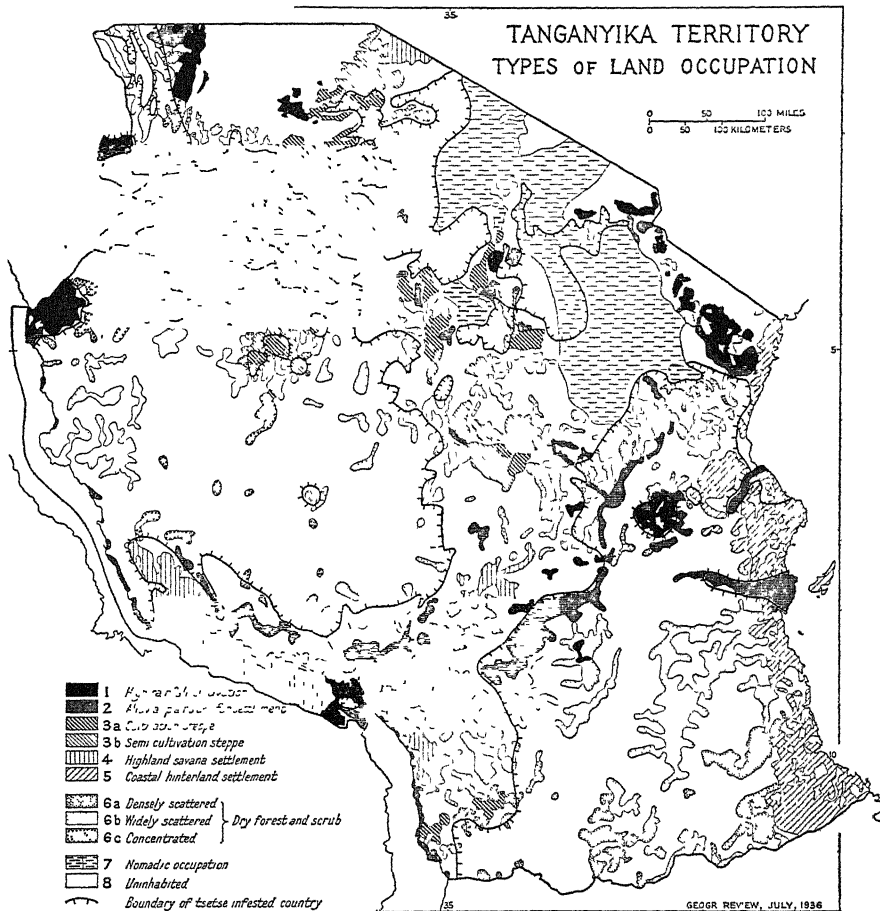


FIG. 9. Tanganyika, showing types of land occupation. (Courtesy of *The Geographical Review*.)

occupancy" to 15,000 acres was granted for the purpose of a sugar plantation by special permission of the Secretary of State. To the west of Meru lies the Oldeani-Ngorongoro area, in which 24 farms were demarcated in 1932; and the settlement appears to be prospering on account of the excellent volcanic soils, the well distributed rainfall, and the perennial

mountain streams. An extension of this settlement to the east to include an area of about the same size seems possible.⁵²

The Babati-Ndareda-Kivu area, below the Iraka-Mbulu Escarpment, has also been surveyed and offered for alienation, but there has apparently been little demand for land in this area, perhaps on account of the threat of tsetse infestation. The highland area of the Serengeti plains to the northwest of Oldeani is considered to be too dry for European settlement, and, indeed, it is almost uninhabited, a considerable part being game preserve (Fig. 8).

There remain the Southern Highlands, which satisfy the altitudinal requirements for European settlement, lying, as they do, on the rim of the plateau and bounded eastwards by the Great Escarpment which overlooks the basin of the Kilombero. Settlement began here in 1926, but land has been alienated slowly on account of the distance to markets and uncertainty as to the suitability of the area for colonization. It is also the policy of the government to alienate land only as it can be developed, so as to prevent speculation. An estimate of the possibilities of the area from the point of view of railway construction has been carefully prepared, and the unavoidable conclusion has been arrived at that "the existing natural conditions, even when utilized with the greatest skill, are so unfavorable as to exclude the possibility of development which might, in a generation or two, pay interest on capital either direct out of railway accounts, or indirect out of general revenue of the Territory."⁵³

The settlements are grouped round five or six centers (Fig. 10). In the northernmost group, round Iringa and Dabaga, the Highland rises to over 2000 meters at the edge of the plateau and the forested Udzungwa Mountains and falls westward to the Savanna and "Miombo" (deciduous dry forest) of the upper Ruaha Basin, where the altitude is less than 1000 meters. Soils are gneissic, of low fertility, and gen-

⁵² Carl Troll and Karl Wien: Oldeani-Ngorongoro, Eine neue deutsche Pflanzungskolonie im inneren Ostafrika, *Wissenschaftl. Veroff. des Museums zu Leipzig*, N. F. 3, Leipzig, 1935.

⁵³ Clement Gillman: Report on the Preliminary Surveys for a Railway Line to open up the South-West of Tanganyika Territory 1929. Crown Agents for the Colonies, London, 1929, pp. 56-57.

erally acid. The rainfall is about 25 to 40 inches. Some 30 farms have been alienated here, mostly in the grasslands but a few in the forest area. The Itunda-Sao settlement bestrides the Great North Road in the flat, dry plateau, where tobacco (Virginia) is being successfully grown on British and German estates. To the south lies the settlement of Mufindi, in the forest and grass uplands of the Great Escarpment, at an altitude of 1800 to 2000 meters. The rainfall is between 60 and 80 inches, and tea is now being successfully grown here as well as in the district of Rungwe at the head of Lake Nyasa. About 35,000 lbs. of tea were produced in these districts in

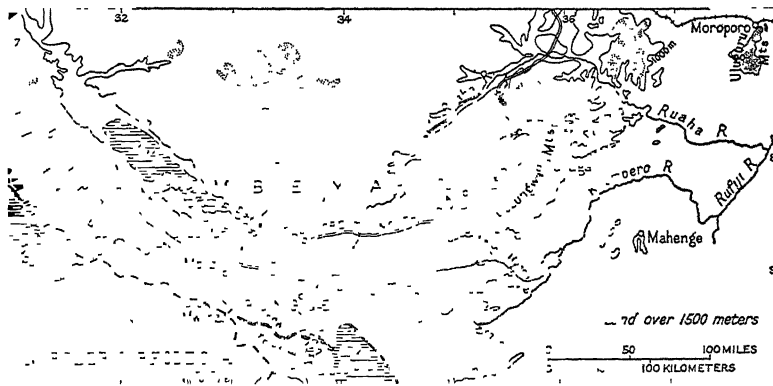


FIG. 10. Tanganyika. The Southern Highlands.

1935, and a German factory, the Kibwele Tee Co., has already been established. A few British and about 50 German farmers have settled here.

Across the Myera basin, 50 miles south of Mufindi, is Lupembe, another small settlement at an altitude of 1,500 to 1,600 meters; and, at about 30 miles to the west, Njombe, with its government veterinary station, is a center of experimental animal husbandry. It has been found in recent months that the Njombe district is not good sheep land at present; the grass is too long. A South African farmer would say that the veld needs to be "tamed" by burning and cattle grazing before it can be suitable for sheep.

Tukuyu, formerly the German mission station and settlement of Neulangenburg, in the heavy rainfall area at the head

of Lake Nyasa, is the largest of the villages or centers in the districts of Rungwe and Mbeya, which include Mbozi, Itaka, and the Lupa River Goldfields. The area between Rungwe and the Songwe River, known as the Konde Plain, has great economic potentiality on account of its high rainfall and rich alluvial soils weathered from the Tertiary alkaline lavas of the Rift Valley floor. A new transport route is now open to Konde Land—by steamer to Domira Bay, and by rail from the Salima Rail Head to Beira.

The great obstacles to development in this southwestern region are labor and transport. Although the Rungwe district has the second highest density of native population in the Territory (32 per square kilometer), the labor is only sufficient for a limited amount of coffee and tea production, and the neighboring districts of Umbeya and Njombe have densities of only 1.8 and 6.2. Produce for export must now come to Dar es Salaam via Mpulungu (at the southern head of Lake Tanganyika), Kigoma, and Tabora. From the Iringa end of the zone of settlement produce must be taken 157 miles by lorry to Dodoma on the Central Railway.

The area of alienable land in this whole southwestern Highland, including the land already alienated, is estimated at 1,028 square miles, or 658,000 acres, with 640 as the approximate possible number of holdings. But settlement now waits on transport; until a railway line is laid, the hope of the small farmer in the area is centered in the possible development of the gold mining in the Lupa Valley.

To the west of Lake Rukwa lies the Ufipa Plateau, about which reports are lacking, but the general opinion is that the area is not sufficiently well watered for settlement. The mean density of the native population is 2.8 per square kilometer.

Below the Great Escarpment, in the Kilombero Valley, although the climate is unsuitable for Europeans, the alluvial plains form areas which in future may be economically developed. At present they are subject to annual flooding, so that they are almost uninhabited.⁵⁴ There seems to be a possi-

⁵⁴ G. Milne: *A Provisional Soil Map of East Afrika (Kenya, Uganda, Tanganyika and Zanzibar) with explanatory memoir*. Amani, East African Agric. Research Station; London, Crown Agents for the Colonies, 1936.

bility that with control of the flood waters in the Kilombero this basin might become a considerable rice-producing area. The native and Greek cultivators around the base of the Uluguru Mountains, to the south of Moroporo, are successfully cultivating rice as well as maize and cotton at altitudes of 100 to 600 meters. German settlers have cultivated these lands in the past, but the general opinion is that these lower cultivable areas are not suitable for European occupation and are best developed by native or Indian cultivators. By 1929 the total area of land alienated to Europeans in the Territory was 1.9 million acres in 1,985 holdings; and in the five years 1931-1935 the area alienated was 137,000 acres, whereas the area surrendered was 167,000 acres.

The second factor affecting settlement in Tanganyika is the distribution of the tsetse fly, which has already been considered for the continent as a whole (pp. 240-41).

In Tanganyika *Glossina morsitans* and *G. swynnertonii* are the two chief carriers of trypanosomiasis. From 1931 to 1935 the deaths from sleeping sickness in the Territory averaged 448 a year, the average annual number of new cases reported to the medical authorities being 1831.⁵⁵ The depopulation of the infected areas is mainly due to nagana, but in the dry Savanna and Miombo, the fly is to some extent being defeated by the concentration areas, where scattered groups of natives are concentrated in large clearings in which the fly cannot exist. But the fly is still the most serious deterrent to settlement in the native areas, and the risk of spread of sleeping sickness owing to movements of natives from district to district is a menace which is being guarded against by the establishment of isolation camps.

Although the fly is unquestionably encroaching on some areas, it is also being attacked successfully in many others; and the most hopeful augury for the future is the willing coöperation of many of the native tribes in the resolute and strategic plans of the Tsetse Research Department.⁵⁶

The control of the alienation and settlement of land in

⁵⁵ *Ibid.*

⁵⁶ Annual Reports to the League of Nations, Tanganyika Territory.

Northern Rhodesia and Nyasaland

The next step south, to the Zambezi, brings us into areas that have a rather greater seasonal climatic contrast, but in which temperature is still an important factor in any consideration of European settlement. The areas with an altitude greater than 1500 meters, or 5000 feet, are relatively small (Fig. 11), and European settlement has tended to take a lower altitudinal limit. The little colony of about 150 Europeans at Abercorn (5407 feet) in the extreme north of the eastern province of Northern Rhodesia is the only considerable part of the population in the colony at an altitude of more than 5000 feet. Along the railway, where settlement is concentrated, altitudes vary from 3160 feet at Livingstone in the Zambezi Valley to over 4000 feet in the north (Bwana Mkubwa, 4315 feet). Whatever one may think of the uplands, the valleys below about 3500 feet are hot and enervating and by general agreement are not areas in which the vigor of the European races can be maintained.

The dry-bulb thermometer readings at Livingstone, Broken Hill, and Abercorn, for 1935, show the relative temperatures at these altitudes at 8 in the morning and 2 in the afternoon and are given in the following table:⁵⁸

	Livingstone 3,160 ft.		Broken Hill 3,920 ft.		Abercorn 5,407 ft.	
	8h.	14h.	8h.	14h.	8h.	14h.
January . . .	71.6	80.8	67.1	75.6	66.2	72.3
February . . .	69.9	82.9	66.6	75.7	63.4	71.0
March	70.8	85.6	67.1	78.4	65.8	71.8
April	66.2	83.6	63.3	75.9	65.3	74.9
May	62.2	82.2	62.4	77.5	65.4	75.0
June	52.2	73.4	55.0	70.9	61.6	74.7
July	54.7	76.9	55.4	71.2	59.4	73.7
August	55.6	77.1	55.9	72.9	59.8	74.4
September . . .	70.1	90.6	68.8	86.2	67.6	81.4
October	79.1	94.0	74.5	88.2	69.1	82.1
November . . .	76.6	89.2	71.2	82.0	68.4	77.7
December . . .	74.0	86.1	70.2	80.8	65.1	69.6

The writer is not acquainted with the sites of the screens

⁵⁸ Northern Rhodesia, Blue Book No. 12, Livingstone, 1935.

at Broken Hill and Abercorn. Abercorn has rather higher humidities than the other two stations, but the difference in climate is sufficiently clearly shown. The fact is that white settlement has not been planned as it has been to some extent in Tanganyika and Kenya, but it has followed a railway line, grouping itself within easy access to markets. The factor of communication has outweighed climatic factors. This is apparently the reason why Abercorn is as yet the only European settlement of more than 100 souls in the northeast of the colony.

Northern Rhodesia has a total area of 185.81 million acres.⁵⁹ Of this area, 71.53 m.a. (million acres) has been set aside as native reserves. These reserves are somewhat scattered (Fig. 11), the largest being Barotseland with an area of 3.82 m.a. Of the remainder of the colony, up to the end of 1932, 8.83 m.a. had been alienated to Europeans, of which 6.25 m.a. were in possession of the British South Africa Company and the North Charterland Company. Of the remaining 2.58 m.a. alienated to Europeans, 120,590 acres were township plots and the remaining 2.46 m.a. rural land. In 1935 this was divided into 982 holdings, of which 576 were larger than 1,000 acres.

Deducting forest, game, and archeological reserves, the total unalienated land in 1935 was 100.43 m.a. To appraise the settlement potentialities of this area it is necessary to examine some important agronomic facts. It is estimated that in 1935 70,000 acres were cultivated,⁶⁰ of which maize occupied 40,000 acres. It was considered that the acreage devoted to maize should be reduced to 37,000 acres.⁶¹ The proportion of cultivated land to grazing land thus stands at rather less than 3 per cent.

It is generally agreed that in Northern Rhodesia, except for high-priced crops such as coffee, tobacco, and cotton, crop production is not profitable beyond a 30-mile haul to the railway line; and, as we have just seen, in this belt some 97 per cent must, under present conditions, be considered as pastoral

⁵⁹ The figures used in this section are taken from the Northern Rhodesian Blue Book, 1935, and the Report of the Department of Lands, 1935.

⁶⁰ Colonial Reports, No. 1769, Northern Rhodesia, London, 1935, p. 13.

⁶¹ Northern Rhodesia, Dept. of Agriculture, Annual Report, 1935, p. 4.

land. It seems to be reasonable to assume, therefore, that the 100.43 m.a. still unalienated should be almost entirely pastoral and not arable land.

Of this 100.43 m.a., some areas must be eliminated from consideration for European settlement on the grounds of climate. The Loangwa Valley below the altitude of 1000 meters, fly-infested, hot, humid, and malarious, will account for rather more than 14,000 square miles, or roughly 9.0 m.a. The Zambezi Valley below the altitude of 1000 meters, excluding native land, has an area of very roughly 2500 square miles, or 1.6 m.a. The Bangweulu Lake and swamp account for rather more than 3000 square miles, or 2.0 m.a., the Lubango swamp being included in native areas. This leaves approximately 88 m.a. of upland pastoral country to be considered. Here we are forced to turn to the distribution of that scourge of the pastoralists—the tsetse fly. In Northern Rhodesia *Glossina morsitans* infests nearly two thirds of the whole country (Fig. 12) and *G. palpalis* is found near Lake Tanganyika. Both varieties are responsible for sleeping sickness and nagana. The Loangwa, Luapula, and Upper Kafue valleys have long been notorious for sleeping sickness, and in 1935 the district of Mumbwa to the west of the railway was found to be heavily infested.⁶² Nagana is so widespread that the distribution of native cattle is controlled almost entirely by the distribution of the fly.⁶³ The native population outside of Barotseland (which is largely fly-free) numbers some 1.03 millions. The number of head of cattle owned by them is 351,000.

Of the 88 m.a. still unalienated, considerable areas are in

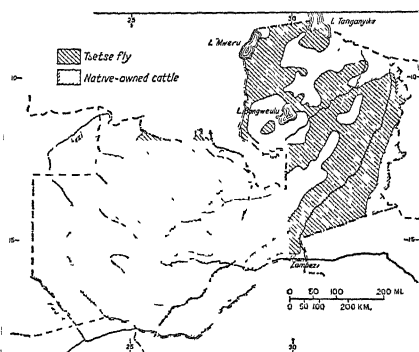


FIG. 12. Northern Rhodesia, showing distribution of tsetse fly and native-owned cattle. (After Ogilvie, *op. cit.*, Fig. 10.)

⁶² *Ibid.*, p. 11.

⁶³ Alan G. Ogilvie: Co-operative Research in Geography, with an African Example, *Scottish Geogr. Mag.*, Vol. 50, 1934, pp. 353-378.

the fly belts in the northwest; almost the whole of Kasemfa must be excluded on this account, and the non-native portion of Mumbwa, with a strip in western Kafue—a total area of some 18 m.a. In the northeastern part of the colony, leaving out of consideration the Loangwa Valley, the North Charterland Company's land along the southeastern border, and the British South Africa Company's land in Tanganyika Province, the fly-free areas follow the backbone of the Uchinga Mountains and the country of 5000 feet to the southwest of Abercorn. The basin of the Chambezi is fly-infested, and the country to the east of Lake Mweru—a total area of roughly 11 m.a. These two fly-infested areas, and the infested western parts of the colony, reduce the 88 m.a. to 59 m.a. Certainly the whole of this fly area is not uninhabitable, and it is probable that means will eventually be found to exterminate the fly. But at present no settlement scheme can reasonably include these areas.

How much of the remaining area would have to be non-settlement ground on account of rugged surface, malarious valleys, lack of water supply, and other factors, it is impossible to say: perhaps the deduction might bring the area available to about 50 m.a.

Until the ecological survey has been completed it is almost impossible to say how many settlers this 50 m.a. of pastoral land can carry. The grasslands are admittedly of low grazing value, and, unimproved, "offer insufficient encouragement for the production of good class beef."⁶⁴ The introduction of Afrikander bulls from the Union has also failed to improve the stamina of poor-bred stock. Apparently the soils are generally acid and deficient in phosphate. It is noteworthy that, outside of the Barotseland-Kalahari sand area, about half of the surface is formed of granites and sandstones,⁶⁵ which, in regions where torrential tropical storms rapidly remove the surface soil, produce eluvial soils of extremely low fertility. It seems probable that ranches of at least 10,000 acres would be necessary for settlers in these areas, so that, assuming the

⁶⁴ Colonial Reports, No. 1561, Northern Rhodesia, London, 1930, p. 20.

⁶⁵ Geological Surveys of Afrique Equatoriale Française, Congo Belge, Uganda, Tanganyika, Nyasaland, Northern & Southern Rhodesia: Geological and Mining Map of Southern-Equatorial Africa, 1:5,000,000, Paris, 1932.

availability of markets and the solution of transport difficulties, 50 m.a. could scarcely provide in the near future more than 5,000 holdings for prospective settlement. Meanwhile the missionaries, confidently expecting a doubling of the native population in 25 to 30 years, urge that no more land should be alienated. The situation, however, is not quite so entirely in government hands as in the other East African Territories, since the British South Africa Company is entitled to half the proceeds of all land alienated.

The question of markets is a serious one in this colony, and an expert has recently advised that local markets are insufficient to justify any extensive endeavor being made with a large settlement scheme.⁶⁶ This refers mainly to the crops of the railway belt—maize and wheat. Coffee is developing steadily in the Abercorn district, where, under irrigation, some 200 acres out of 550 planted yielded 630 cwt. in 1935. Soils here need heavy manuring, and the white stem borer (*Anthores leuconotus*) has become a problem.

Cotton is still in the experimental stage and in addition to a highly unreliable rainfall has had to contend with the American bollworm (*Chlorida obsoleta*) and spiny bollworm (*Earias insalama*) and two species of stainers. In the "sweet bush" or "Acacia Savanna" of the railway belt a trial of eight strains of the "U₄," which has had so much success in Nyasaland, "failed to give significant results." The stainer (*Dysdercus supersticiosus*) uses the cotton plant as an intermediate host between the early and late stages of the wild hosts of the bushveld.⁶⁷

Tobacco has reached its peak of production under present conditions, and only the finest leaf can now be exported. The prospects of agricultural production, therefore, inspire an attitude of caution with regard to the extension of European settlement in the near future.

In Nyasaland the settlement outlook is colored by the fact that the government is now committed to a policy of native development. Of the total area of 25 m.a., about 4 m.a. have

⁶⁶ S. Milligan: The Present Position of the Agricultural Industry and the Necessity, or otherwise, of encouraging further European settlement in Agricultural Areas, Gov. Printer, Northern Rhodesia, 1931.

⁶⁷ Northern Rhodesia, Annual Report, Dept. of Agriculture, 1925, p. 8.

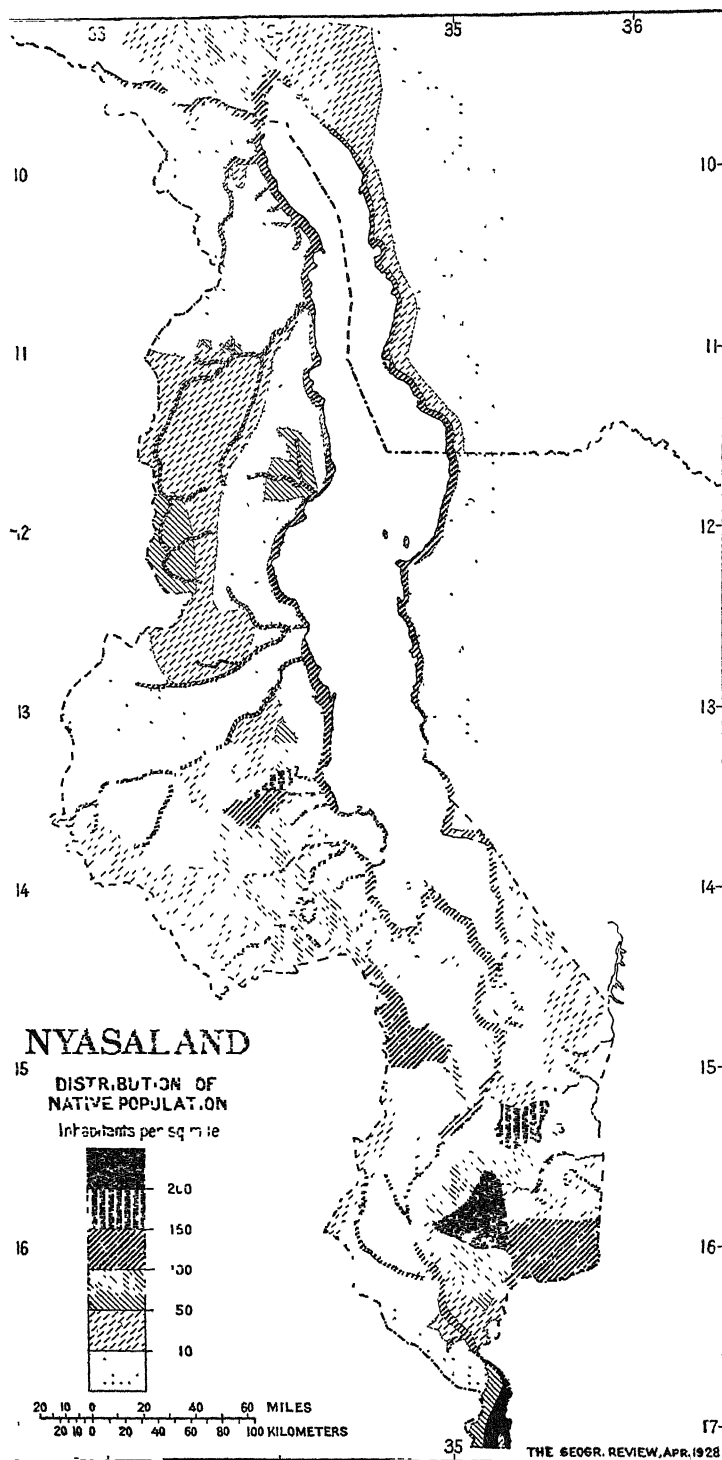


FIG. 14. Map of Nyasaland, showing distribution of native population according to the census of 1926. (Courtesy of *The Geographical Review*.)

already been alienated or leased to Europeans; 2.7 m.a. of this is the British South Africa Company's estate in North Nyasa; the remainder is held by Europeans mainly in the Shiré Highlands (the districts of Blantyre and Zomba), in the Mlanje and Cholo Mountains to the southeast of Blantyre, and in the Lilongwe Uplands in the extreme south of the northern province (Fig. 13). Seventy-six per cent of the European population of 1,781 (in 1935) is settled in these highland areas. In 1932, 283 Europeans were planters or agriculturists—a decrease of 116 since 1921. The native population of 1,600,076 has a mean density of 62.5 to the square mile in the southern province (to the south of Lake Nyasa), and 33.3 to the square mile in the northern province, which is an area of 25,000 square miles, rather more than twice the area of the southern province. The distribution by districts (Fig. 14) shows densities varying from 297 per square mile in the Chiradzulu district, to the east of the Shiré Highlands, to 7.5 in the Kasungu district, to the west of the lake. The highest densities reach 557 to the square mile in fertile lands near townships.

The native population, with an average density over the whole Protectorate of 43 to the square mile, is thus needing room for development; and in spite of the fact that 35 per cent of native children die before the age of puberty⁶⁸ the native population has increased by 33 1/3 per cent since 1921. It is probable that this increase is due largely to immigration from neighboring areas in Mozambique.

In the southern province native labor supply has been a serious problem on the European estates; the native prefers to grow his own cotton—which he was cultivating long before the Europeans arrived—to laboring as a squatter on European estates. The crops grown by Europeans are coffee, tea, and tobacco, sisal having become unprofitable. Coffee, until recently, has been entirely in European hands and occupied in 1931 some 1500 acres, with a production of 1,175 cwts. Since 1921 the industry has been in a critical condition on account of the ravages of the white stem borer (*Anthores leuconotus*). It is also being realized that the soils of Cholo

⁶⁸ Colonial Reports, No. 1658, Nyasaland, London, 1932, p. 8.

and Zomba are too deficient in phosphates and humus for good coffee growing, even with irrigation. Natives are being encouraged now to grow the crop. This is a case where low yield, inferior quality, and low prices are offset by the native's lower standard of living. Tea is grown exclusively by Europeans in the Mlanje and Cholo Highlands. Under the international restriction scheme, the maximum area allowed to Nyasaland planters is 17,700 acres until March 1938. In 1935, 16,054 acres were planted—8,580 in Mlanje and 7,474 in Cholo.

With regard to cotton, the lower Shiré River plain produces at present ten times the amount grown in other parts of the Protectorate, and the 1934 production was doubled in 1935. Since the introduction of the Jassid-resisting type, "U4," produced at the Barberton Experimental Station in the Transvaal, the cotton industry has made rapid strides in Nyasaland, and the export of lint in 1935 amounted to 8.2 million lbs. The increases in production in 1935 are worthy of notice, since they indicate the direction in which developments may be looked for. The Lower River crop increased 31 per cent, to 6,485 tons of seed cotton. The central area of the southern province produced 1,429 tons, nearly six times as much as in 1934. The Lake Plains between Ncheu and Kota-Kota increased the 1934 amount of 175 tons to 1,774 tons of seed cotton in 1935. (On crown land the total amount produced was, therefore, 9,737 tons, and to this must be added 1,500 tons grown on private estates.) Undoubtedly the extension of the railway to Salima, in the plain to the south of Domira Bay, will have a great effect on cotton growing along the western lake shore.

Competent observers anticipate that three times the cotton-growing land of the lower Shiré Valley will be opened up here, adding probably an extra 200,000 acres of cotton land and possibly 50,000 bales of lint.⁶⁹ The soils in the Domira Bay region are known to be of very great fertility, but it is rather doubtful if the lake plains to the north of Kota-Kota

⁶⁹ Trade and Engineering Supplement, *The Times* (London), April 1935, p. xx.

can be developed along these lines. The soils there are more sandy, surface water is less abundant, and farther north in the alluvial belt between Florence Bay and the Songwe River the cotton crops had to be abandoned in 1926 on account of the ravages of the pink bollworm from Tanganyika.⁷⁰ These lake plains are crown land, lying below the 1000-meter contour, and are cultivated by natives.

Tobacco, the export of greatest value, is also becoming unpopular for Europeans at market prices; and now more than two thirds of the crop is grown by natives. It seems as if the best days of the European agriculturist in Nyasaland are passing. The natives are proving their ability to produce export commodities at prices that do not permit of European standards of living, and, with the exception of the tea plantations, the native is encouraged in every way to develop the potentialities of the land. The recent expenditure of £40,000 from the Colonial Development Fund, which provided 97 boreholes and wells, opening up 100 square miles of dry interfluvial land, is an earnest of the government's intentions in this direction.

The only areas available for future European settlement are now in the middle of the northern province, where the Vypia Plateau lies at an altitude of over 5000 feet, and in the British South Africa Company's land in north Nyasa. The density of the native population is low here, and there is considerable coming and going of natives to and from Northern and Southern Rhodesia. This labor supply can doubtless be utilized in any European settlements that may be possible in this area.⁷¹ The uplands, however, are of doubtful value as pastoral areas; the soils and vegetation seem to have much the same characteristics as those of Northern Rhodesia; and the tsetse fly is unfortunately spreading eastwards towards the lake. The main difficulty at present, however, is in connection with communications, which will perhaps be facilitated by the new extension of the railway to the lake.

⁷⁰ F. Dixey: The Distribution of Population in Nyasaland, *Geogr. Rev.*, Vol. 18, 1928, p. 284.

⁷¹ Report of the Commission on Closer Union of the Dependencies in East and Central Africa, Cmd. 3234, London, 1929, pp. 254, 261, 262.

Southern Rhodesia

In Southern Rhodesia, with its population of 53,000 Europeans and 1.15 million natives, the position with regard to settlement potentialities is fairly clear. Following the report by the Land Commission of 1925, the land of the colony was

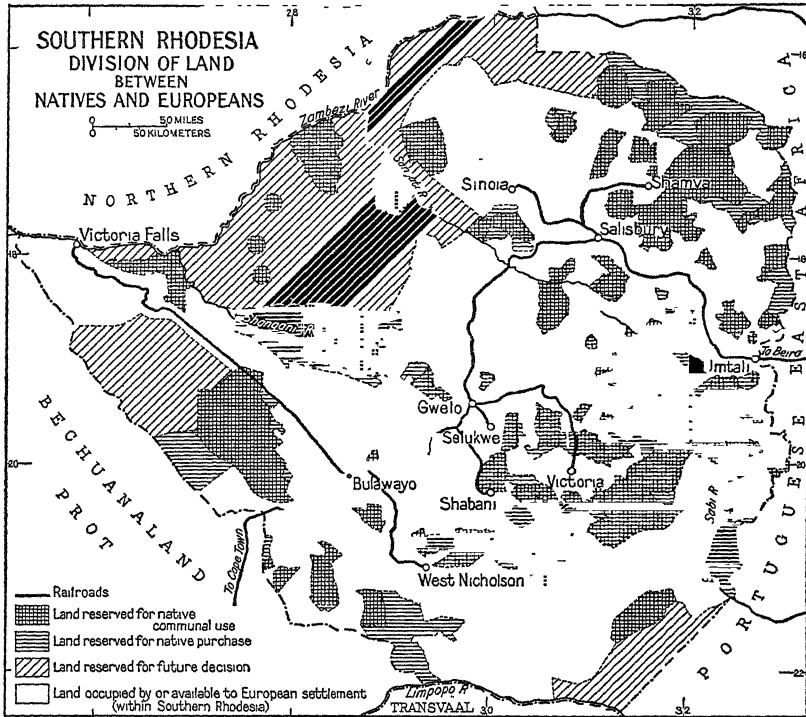


FIG. 15. Division of land between natives (ruled areas) and Europeans (blank areas) in Southern Rhodesia. Compare with Fig. 16, showing European-owned land. The patches unaccounted for by ruling when both maps are superimposed represent crown lands not yet disposed of and, on the northern side of the railroad between Victoria Falls and Bulawayo, a forest area. (From *Pioneer Settlement*, Amer. Geogr. Soc., New York.)

apportioned into clearly defined areas. Of the total area of approximately 96 million acres, native reserves and land purchasable by natives amount to 28 million acres; land already occupied by Europeans, 31 million acres; land reserved for further delimitation, 18 million acres (Figs. 15 and 16). Allowing for various other reservations, the unalienated land

still available for European occupation amounted to about 17 million acres. From 1927 to 1935 the net increase in alienated land was about 2.8 million acres, so that the approximate area of land still available for alienation is about 14 million acres.

Of the 18 million acres reserved for future consideration

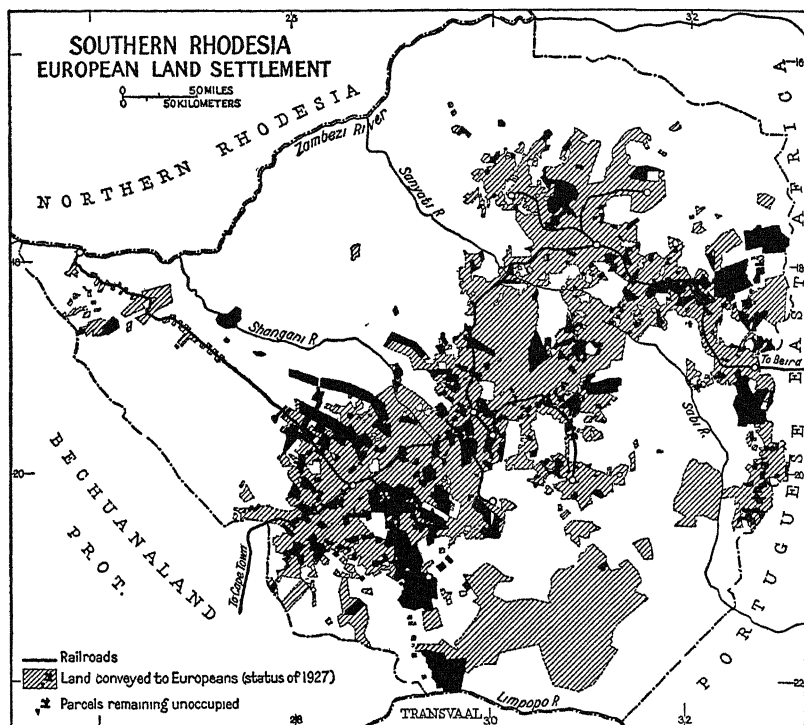


FIG. 16. Land in European ownership in Southern Rhodesia (ruled and black areas). Only the black areas are unoccupied. (From *Pioneer Settlement*, Amer. Geogr. Soc., New York.)

it does not seem likely that much will be available for other than future native occupation. The native population is increasing, this land is mostly low-lying, and at present a great part of it is infested with *Glossina morsitans* (Fig. 17) and will not be available as cattle country for many years.

Altitude is still an important factor in settlement, and the lower limit of the land with "temperate" climate is estimated to be about 4000 feet (Fig. 18). About 24 per cent of the colony lies above this altitude, and approximately 89 per cent

of the European inhabitants are settled on the "plateau" districts above or near the 4000-ft. contour.⁷² The lower areas forming middle veld and low veld are not by any means uninhabitable by Europeans, but they are hotter, more enervating, and more malarious; and of the 5,000 settlers in these

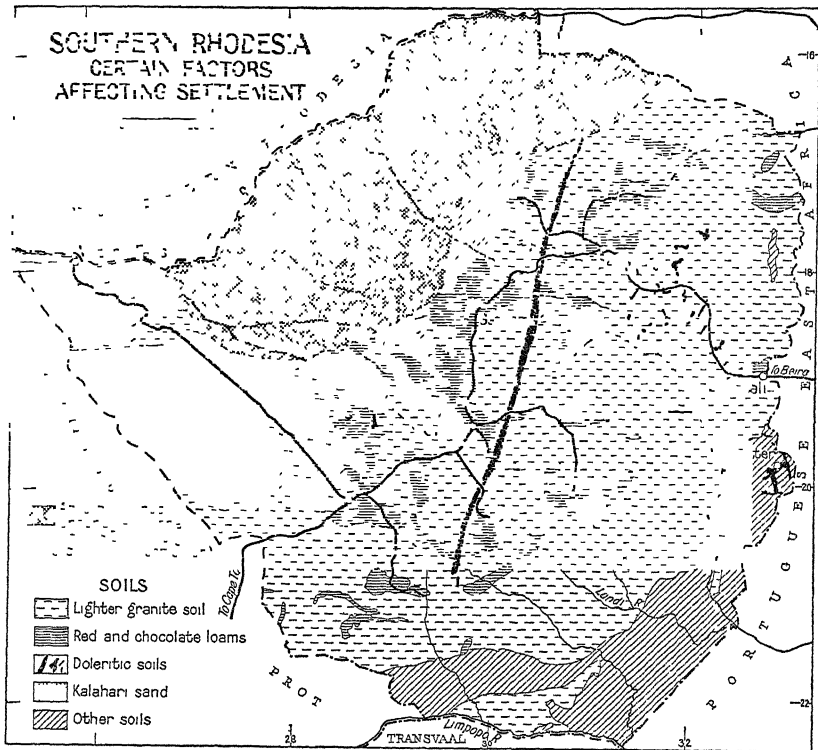


FIG. 17. Soils of Southern Rhodesia. In the north the area in which the tsetse fly occurs is outlined from local information obtained by H. C. Darby. (H. Clifford Darby, "Pioneer Problems in Rhodesia and Nyasaland," *Pioneer Settlement*, Amer. Geogr. Soc., New York). (Courtesy of the American Geographical Society.)

zones at the present time, most of them are connected with mining operations, in government posts, or on mission stations. Because of the high temperatures these lower areas are certainly not recommended for settlers of the North European stocks, although it is possible that they might be more suitable for Europeans of the Mediterranean racial type. The incidence of malaria is heavy. Moreover, the annual rainfall

⁷² Official Year Book of the Colony of Southern Rhodesia, No. 3, Salisbury, 1932, p. 570.

of less than 25 inches is considered to be too low for successful crop production.

The main crops grown by the 3,000 farmers in Southern Rhodesia are maize and tobacco, the former being most suited to the red and chocolate loams weathered from the basement schists (Fig. 17), and tobacco thriving best on the sandy soils weathered from the granite. In 1929-1930, 2,261 farmers were growing maize, which occupied 318,000 acres. In 1935,

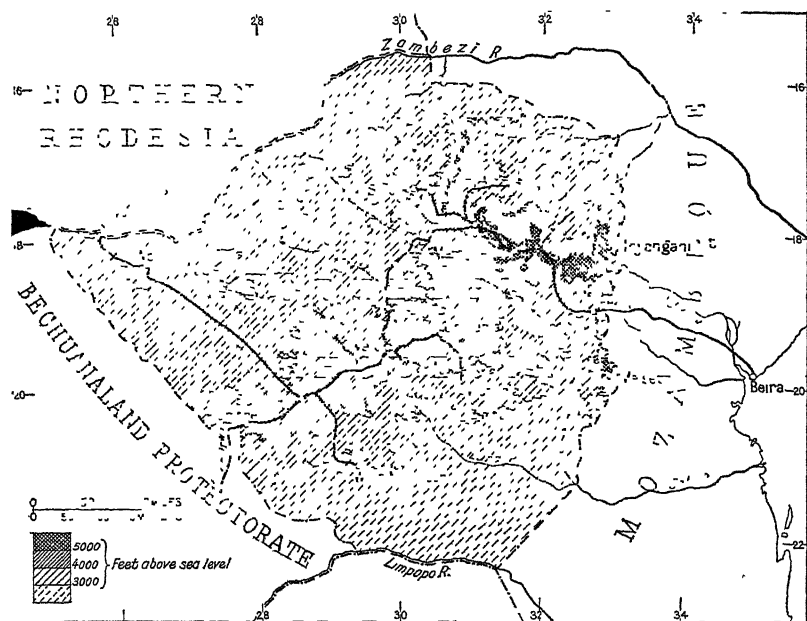


FIG. 18. Southern Rhodesia, from contour map by the Southern Rhodesia Geological Survey. (From *The Pioneer Fringe*, by Isaiah Bowman, Amer. Geogr. Soc., New York.)

the acreage was 266,000, and owing to adverse climatic conditions the yield fell from 7 bags per acre in 1934 to 4.76 bags in 1935. Of the total of 1.3 million bags produced in 1935, rather more than 250,000 bags were exported, compared with 323,000 for 1934.

Tobacco occupied 41,000 acres, almost all of it being the bright-leaf Virginia type. The total yield in the first eleven months of 1935 was 21,000,000 lbs., of which 18,000,000 lbs. were exported. Although new markets are being investigated, and an agreement has been arrived at with Northern

Rhodesia and Nyasaland, it would seem that the demand for Rhodesian tobacco has almost reached its limit for the present, and settlement could scarcely be encouraged on the basis of further profitable production in the near future.

A small amount of winter wheat can be grown on vleis and damp alluvial soils or by irrigation, but the possibilities here are not very great. In 1935 a record area of 20,000 acres was planted, and 60,000 bags would be considered a fair return from this acreage. Only very limited areas are suitable for this dry-season crop.

Of the other crops only small areas are planted. Groundnuts and cotton were grown on 7,000 and 6,000 acres, respectively, in 1929 and 1930. An increase seems possible in groundnut production, but cotton has not been very successful, and it is now proposed to encourage natives to grow the crop in such areas as are likely to give reasonable return. "At existing prices there seems to be no other crop which can be grown by natives which can better bear the cost of transport and overseas marketing."⁷³

With regard to pastoral farming, sheep are not well suited to the long grass of the greater part of the colony but do well in the eastern border districts, where the upland grass is more suitable. There were only some 90,000 European-owned sheep in the colony in 1929-1930 and some 270,000 native-owned sheep. Cattle, however, find conditions more favorable, and the basis of breeding is the small, slow-developing native-owned cattle which are indigenous to the area. It is found that the indigenous grasses of Rhodesia are not sufficiently nutritious for fast-growing stock, and imported breeds have to be stall-fed during the winter months. The great majority of European-owned cattle are in herds of less than 1,000 head. Rather more than 100 farmers have herds of 1,000 or more; some ranches have, of course, much larger numbers than these. In 1929-1930 there were about a million European-owned cattle in the colony, but the outbreak of foot-and-mouth disease has given the industry a setback. The occurrence of trypanosomiasis in the eastern border provinces

⁷³ Southern Rhodesia: Report of the Secretary, Department of Lands, Salisbury, 1935, p. 8.

seems to indicate an extension of the fly (*G. pallidipes* and *G. brevipalpis*) from the Portuguese low veld; but in the main (northern) zone the fly is being driven back, and the threat to the European pastoral industry is being removed.

In the south of the colony, within the zone of less than 25 inches rainfall, cattle ranching is established, and exports of chilled beef have been attempted; but the future of the industry appears to be uncertain, and the export can be maintained only with the assistance of bounties, unless overseas prices improve. The alternative appears to be a restriction of the number of cattle to be dealt with in the canning and extract factories. In 1935 the two chief canning companies were able to handle some 83,000 head for canning and beef extract. The export quota of chilled beef was limited to 187,000 cwts. for the year. Thus there is not a very encouraging prospect for settlement on a large scale under present conditions.

With maize production an important factor is transport. It rarely pays to grow maize farther than about 20 miles from the railway; 30 miles is almost an absolute limit. The condition of land occupation at the present time is that almost all cultivable land within 15 miles of the railway lines is occupied; new settlers will have to buy land already alienated, or else take up land near the transport limit of profitable grain production.

The type of settler encouraged by the government is one with a capital of £1,500, for a young man without family responsibilities, to £2,500 for a married man with no previous experience in farming under African conditions. For a settler intending to purchase an established farm the capital required is about £5,000. For mixed farming, holdings of from 1,000 to 2,000 acres are generally required, whereas for ranching or stock farming on a large scale in the drier zone some 10,000 to 20,000 acres are necessary.

It should be mentioned that the government is encouraging settlement by a generous purchase system. The first instalment of one-twentieth of the purchase price is paid by the settler on the date of the grant, after which is a period of three years without payment followed by nineteen annual instalments of the balance. The European population is predominantly Brit-

ish; but Europeans of other nations form about 7 per cent, and Asiatics about 2 per cent, of the total number of immigrants from 1915-1930.

The Portuguese Colonies

The Portuguese colonies on the western and eastern sides of the continent provide very great contrasts from the point of view of settlement potentialities. Angola is one of the few parts of tropical Africa in which there is high plateau country awaiting European settlement.⁷⁴ The colony falls into two distinct topographic regions—the coastal zone and the plateau. The coastal zone varies in width from about 150 miles in the north to a very narrow strip, some 10 to 15 miles wide, behind the Bahia dos Tigres in the south. Except near the Congo, this zone has less than 10 inches of rainfall, decreasing towards the almost rainless desert area in the south. Cultivation in this coastal area is possible on a considerable scale only in the alluvial flats which can be irrigated; and the sugar production in the neighborhood of Dombe Grande, Luacho, and Cassequel is the chief agricultural industry of the littoral zone. These estates are directed by the Portuguese, but the labor is largely native.

The mean temperatures do not appear to be very high (Loanda: Feb. 79° F.; Aug. 67.5° F.), but the diurnal range is low (minimum range, Jan. 3.4° F.; maximum, June 7.9° F.), and the mean relative humidity does not fall below 83 per cent.⁷⁵ The climate is thus too enervating for healthy European settlement, and malaria is severe in the valleys.

The ascent to the plateau along the Benguela Railway is through a densely bushed region, in which the veld is sweet, but the lack of water is the great deterrent to settlement and pastoral farming. The summit of the plateau, or "plan alto," is reached at Kalenga, some 230 kilometers from the coast and just over 6000 feet above sea level (Fig. 19).

The western part of the Angola plateau falls naturally into two rather separate regions: the northern part, known as the Malange Highlands, having a general altitude of between

⁷⁴ Valuable information can be obtained from O. Jessen: *Reisen und Forschungen in Angola*, Berlin, 1936; and Leo Waibel, *op. cit.*, pp. 231-241. (Edit.)

⁷⁵ A. Knox: *The Climate of the Continent of Africa*, Cambridge, 1911, p. 249.

2000 and 4000 feet; and to the south of the Cuanza Valley, the Bihé or Angola Highlands with its southern extension in the Huila Highlands. This central and southern plateau area—the “breast of the country”—having an altitude of more than 5000 feet, is considered to be the area of potential settlement for Europeans.

Climatic records of this highland area are not available. The range of temperature (presumably the range of the

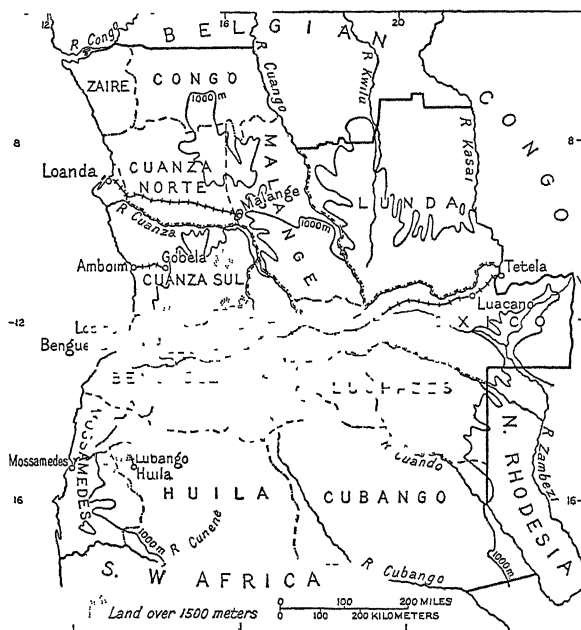


FIG. 19. Angola, showing land over 1500 meters high.

mean monthly temperatures) is apparently between 59° F. (15° C.) and 70° F. (21° C.);⁷⁶ but the diurnal range is considerable, and frosts are common in the southern area. The plateau rainfall is said to be everywhere more than 40 inches, in some places exceeding 55 inches. It occurs almost entirely in the summer, and winter crops require irrigation. In this central and southern highland region maize in the summer and wheat in the winter are grown here and there by the few scattered settlers, as well as tobacco, potatoes, beans, and

⁷⁶ Angola: Foreign Office Handbook, No. 120, London, 1920.

citrus fruits. Sisal and coffee have also been tried on the plateau with some success. It is found, however, that the soils are generally not sufficiently fertile in many parts for coffee: apparently the need of fertilizer and humus is recognized here as it is in Northern Rhodesia. Soils generally seem to vary greatly with topography and locality. Along the Lobito Railway the soils are generally sandy and of low fertility.⁷⁷ One is reminded of Southern Rhodesia, where the railway also follows the watershed and where farms some distance from the line and away from the watershed have generally more fertile soils than those near the railway. On the Angola plateau apparently almost everywhere there is recognized a deficiency of lime and phosphate in the soils.

Over much of the plateau there appears to be good grassland suitable for cattle, but in some areas the high rainfall and the sandy soils, weathered from rocks of the fundamental complex, have produced sour grass of very little nutritive value for stock. In other areas, such as the belt 100 kilometers wide between Silva Porto and Chingua on the railway, the pasture is infested with the grass-killing "Ngoti" weed (*Brachystegia boehmii*),⁷⁸ and the veld in such areas is unoccupied even near the railway. How much of the plateau is affected by these conditions is not fully known.

So far as health is concerned, the plateau at altitudes of 5000 feet and over appears to be well suited to settlers of European stock. Malaria is prevalent in the summer, and individuals antipathetic to quinine are probably not suited for this region. Blackwater fever, dysentery, filariasis, and spirillum fever are not uncommon, the last-named disease being carried by a ticklike insect called by the natives "Nkufu" or "Kimputu," and found at altitudes not lower than 2000 feet.⁷⁹ It is thus a highland malady.

The tsetse fly is present in most parts of the colony. *G. palpalis* appears to carry sleeping sickness only in the northern part of the colony and in the lower valleys. On the plateau *G. morsitans* is the carrier of animal trypanosomiasis. How

⁷⁷ T. A. Barns; *Angolan Sketches*, London, 1928.

⁷⁸ *Ibid.*, pp. 39 and 106.

⁷⁹ *Ibid.*, p. 171.

widespread this disease is has apparently not been fully ascertained.

There are some 40,000 Europeans in Angola, most of them in the towns or settled in the western part of the plateau near the Benguella and Mossamedes railways. The natives number some 4 millions. The government is already enforcing regulations to prevent unfair exploitation of native labor: the Decree of 1926 lays down freedom of labor and of contract for natives, and recruiting of native labor is strictly controlled. There appears to be, however, a fair supply of labor available for the settlement which may be possible in the near future.

The system of "collective colonization," which is being favored by the Portuguese, has for its object the establishment of zones in which Portuguese families with farming experience will be given a hundred hectares each. A "mission rurale" will be attached to each district to advise the new settlers on farming matters. Outside of these "zones of colonization" concessions will be granted, the maximum area for concession being 15,000 hectares on the western part of the plateau and 30,000 hectares elsewhere.⁸⁰

The plateau surface at altitudes of over 1500 meters above sea level has an area of about 30,000 square miles, or some 800,000 hectares. In the production of maize, wheat, and sisal, transport facilities will undoubtedly determine the profitability of cultivation. A very favorable factor, however, is the nearness to European markets in comparison with the East African colonies and the presence of a considerable demand for fresh foodstuffs in the lower Congo, the diamond fields of the Kassai, and the Katanga mining belt.

On the eastern side of the continent, Portuguese East Africa, or the colony of Mozambique, covers an area of approximately 298,000 square miles, of which about two thirds lies below the altitude of 1500 feet. Administratively, the colony falls into two divisions: about one sixth of the territory (52,000 square miles) is under the control of the Mozambique Company until 1941. The rest is divided into the districts of Lourenço Marques and Inhambane in the south;

⁸⁰ L. P. Mair: *Native Politics in Africa*, London, 1936, pp. 256-257.

Tete, Quelimane, Mozambique, Cabo Delgado, and Nyasa in the north. Great areas of the Company's territory and of the interior of the northern districts are still very little known, and it is, therefore, impossible to consider settlement potentialities except in a very general way.

Except for the small areas having an altitude of over 1000 meters (Fig. 20), the climate is probably everywhere of Köppen's Tropical type, with summer rainfall and pronounced dry winter.⁸¹ The rainfall varies from about 1400 mm. in the coastal belt between Quelimane and Beira to some 700 mm. in the interior of the Zambezi Valley, and is authoritatively stated to be too irregular for successful agriculture, for which irrigation is necessary, especially in the southern districts of the colony.⁸²

This fact and the lack of communications over the greater part of the colony are responsible for the zonal grouping of the chief agricultural industries (Fig. 20). The coastal belt forms one zone with plantations of coconuts, sisal, and a little cotton. There is easy coastal communication between these plantations and the larger ports. The remaining belts are along the more important rivers. In the south the valleys of the Limpopo, Incomati, Umbeluzi, and Maputo are the most important cultivable areas; and the production of bananas,

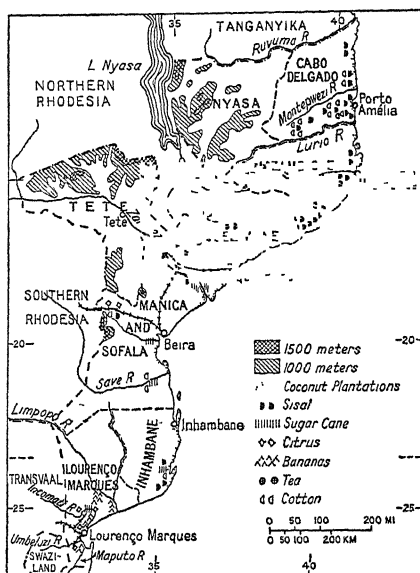


FIG 20. Map of Portuguese East Africa, showing provinces, land over 1000 and 1500 meters high, and agricultural areas. (After C. de Melo Veirol; the provincial boundaries are from Fig. 8, U. S. Dept. of Agric. Technical Bulletin No. 466.)

⁸¹ C. L. Robertson and N. P. Sellick: "The Climate of Rhodesia, Nyasaland and Moçambique Colony," in Koppen und Geiger: *Handbuch der Klimatologie*, Bd. V, Teil X, Berlin, 1933, p. 11.

⁸² Portugal: *Colonie de Moçambique, L'Agriculture*; Exposition Coloniale Internationale, Paris, 1931, p. 4.

sugar cane, pawpaws, and other fruits is here stimulated by the nearness of the Transvaal markets.

A second zone lies between the Save (Sabi) River and the Beira-Salisbury Railway line, where sugar is grown in the low alluvial strips along the Save and Buzi rivers, and some mixed cultivation is carried on in the railway belt. Along the railway some 270 farms are well established with a total area of 51,000 hectares under cultivation, maize forming the chief crop, of which the production amounts to 17,000 tons.

A third zone is that of the Zambezi Valley, particularly below confluence of the Shiré River, where the alluvial flats are irrigated and produce sugar cane, sisal, and some cotton.

The fourth well-marked zone is the hinterland of Porto Amelia, where sisal and cotton are planted in the valleys of the Lurio, Montepwezi, and other small rivers. The extent to which these regions have developed may be indicated by the areas under cultivation and the amounts produced. Sugar occupies 22,500 hectares, and the total production is 70,000 tons. Coconut plantations are in native and European hands; some 11,000 palms and 61,000 hectares give an export of copra of 22,000 tons. The export of groundnuts is 25,000 tons, in addition to local consumption. Cotton is in the experimental stage: less than 2,000 tons a year were exported during the period 1926-1930. Citrus occupies 1,100 hectares, and the export is 1,630 tons.

Stock farming is possible only in a few areas owing to the presence over almost all the colony of the tsetse fly. Besides, the grass in the sandy, Quaternary deposits of the coastal plain and the sandy soils weathered from the granites and the Karroo sandstones give poor pastures for stock. The best areas of grazing are along the river courses, where, naturally, the fly is generally present in greatest numbers.

It is difficult to appraise the value of the colony for settlement. The non-native population in 1928 was made up of some 18,000 Europeans, 8,000 Indians, less than 1,000 of the Yellow Races, and 8,000 of mixed blood. The natives number about 4 millions.

The irregularity of the rainfall, the sourness of the savanna grasses, and the difficulty of transport over most of the colony

make settlement extremely unattractive in the interfluvial areas of the lowlands. In the valleys themselves, although cultivation is profitable and many of the rivers can be used for transport, the drawbacks are the frequency of floods in the lower alluvial plains and the unhealthy high temperatures and high humidities added to the widespread distribution of *Anopheles gambiae* and several of the *Glossina* species. It seems probable that in the area below about 1500 meters the land is most suitable for natives and colored folk. Even the Portuguese find the conditions inimical to energy and the vigor that should be the birthright of men of European stock. It seems probable that when the late Nyasaland Company's territory has been explored considerable areas suitable for European settlement may be found in the Lago district and in the western region of the district of Mozambique.⁸³ Already the slopes of the Namuli Mountains are being planted with tea, and the enterprise seems to be succeeding. In the Maravia region of the Tete district, too, a considerable area along the Rhodesian and Nyasaland boundary is highland. The extent of upland country over 1000 meters above sea level appears to be less than 15,000 square miles, and the climate of these hill regions is said to be pleasant and healthy for the greater part of the year.⁸⁴ The extent to which they can be settled seems to depend upon the availability of water and the development of communications.

South and South West Africa

In the Union of South Africa there remains very little land suitable for settlement under present conditions. It is estimated that, excluding native reserves, game reserves, and forest reserves, 10.8 million morgen⁸⁵ of crown land still remained unalienated in 1936. The only large block of unoccupied crown land is situated in the southern Kalahari between the Orange and the Molopo rivers. The remaining areas are scattered, most of them in the Limpopo Valley, in

⁸³ O. Dieterich: Der Norden von Portugiesisch-Ostafrika, *Petermanns Mitt.*, Vol. 65, 1919, pp. 213-216.

⁸⁴ E. O. Thiele and R. C. Wilson: Portuguese East Africa between the Zambesi River and the Sabi River: A Consideration of the Relation of Its Tectonic and Physiographic Features, *Geogr. Journ.*, Vol. 45, 1915, p. 17.

⁸⁵ A morgen = 2.12 acres.

Zululand, and in the southeast Transvaal (Fig. 21). In the last-named areas little settlement is possible without irrigation. In the interior of Zululand the mean annual rainfall is satisfactory (Nongoma 40") but the reliability is low, the average deviation being about 44 per cent. The valley floors are subject to disastrous floods in seasons of heavy rainfall. In many parts of this area underground water supplies are also scanty and unreliable on account of the amorphous or

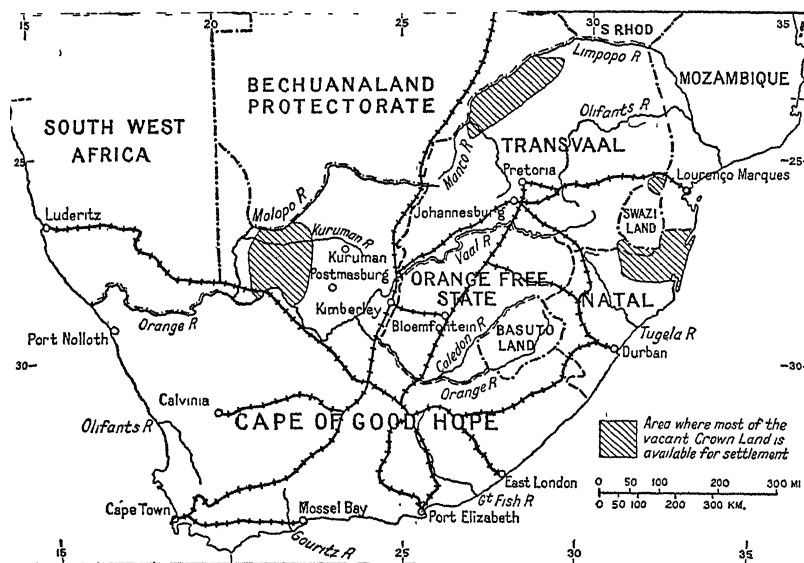


FIG. 21. Map of the Union of South Africa, showing areas where most of the vacant (crown) land is available for settlement.

colloidal matter derived from the constituent minerals of the Karroo beds.⁸⁶

The results of settlement in Zululand during the boom period after 1920 were disappointing. Cotton was a failure owing to a series of droughts and floods; cattle farming was found to be impossible in many parts owing to nagana, and malaria proved to be severe. Now the Pongola River has been dammed and some 12,000 acres brought under irrigation. The government is not encouraging further settlement in this area until the incidence of malaria has been consider-

⁸⁶ A. L. Du Toit: Borehole Water Supplies in the Union of South Africa, *Trans. Min. Proc. South African Soc. Civ. Eng.* (Cape Town), Vol. 26, 1928.

ably reduced and the tsetse fly controlled. Investigations are in progress with both of these objects in view, but it will be a considerable time before conditions in the low coastal plain will be such as to encourage settlement.⁸⁷

In the Limpopo Valley the most serious factor in settlement is the low rainfall (less than 20 inches), its extreme unreliability,⁸⁸ coupled with the high evaporation factor and the porous sandy soils. The region is bushveld and is considered to be suitable for ranching, and holdings of more than 10,000 acres are generally considered to be the economic unit, since 80 acres are necessary for each beast.⁸⁹ In 1919-1920 it was decided to offer six blocks of farms in this area, their sizes varying from about 25,000 acres to about 63,000 acres, for the purpose of testing the ranching possibilities of the region. The intention was to encourage individuals or syndicates to improve the grade of cattle possessed by the smaller settlers of the valley by the introduction of high-grade bulls and progressive methods. By 1927, of the six ranches so established five had failed through droughts and market slumps. The region has now been recognized by the Department of Lands as a "one per cent area," under Section 5 of the Land Relief Act No. 25 of 1931, whereby holdings of land in arid or semiarid parts of the Union are held by the occupiers on payment of one per cent interest on the valuation of the holdings.

The southern Kalahari area is amongst the most arid parts of the Union: the annual rainfall is less than 10 inches over most of the area. Moreover, the surface is formed of red Kalahari sand, in many places thrown into fossil dunes with "straate," or panlike depressions, between them. The vegetation is bushveld, but after the infrequent rains there is a good deal of grazing. The factor inhibiting settlement here, as in the rest of the Kalahari,⁹⁰ is the lack of surface water and the great difficulty in sinking boreholes in the deep Kalahari

⁸⁷ J. H. Wellington: "Pioneer Settlement in the Union of South Africa," Pioneer Settlement, *Amer. Geogr. Soc. Special Publ. No. 14*, 1932, p. 153.

⁸⁸ F. E. Plummer and H. D. Leppan, *op. cit.*, pp. 59-60.

⁸⁹ J. H. Wellington: Land Utilization in South Africa, *Geogr. Rev.*, Vol. 22, 1932, pp. 205-224.

⁹⁰ B. E. H. Clifford: Habitability of the Kalahari, *Geogr. Journ.*, Vol. 77, 1931, pp. 355-357.

sand. During the South West Africa Campaign, however, in 1915, a series of boreholes was sunk along the Kuruman River bed which formed the route from Kuruman to the German border. The desire to maintain this line of waterholes led to the transference of the Kalahari game reserve from this region to the area between the Auob and Nossob rivers, and this southern Kalahari region was thrown open for "water prospecting." The farms along the Kuruman River and in the extreme south of the region, along the road connecting Upington with Postmasburg, are almost the only ones yet established here. There can be little cultivation in such a region, and the water supply is sufficient only for pastoral farming on a small scale. These are truly outposts of settlement.

On already occupied land, however, there is a process of settlement still going on. The government is encouraging settlers by purchasing farms held by companies or by private individuals at the request of the settlers, who pay one tenth of the purchase price on occupation and the balance over a period of forty years. In this way, large holdings are gradually being split up into smaller economic units where this is advisable, and a gradual movement in the rural population is taking place from the more arid parts of the Cape Province to the more favorably situated lands in the Transvaal.⁹¹

From 1912 to 1933 over 5,148 settlers were allocated on farms under this "contributory purchase" scheme, of whom 4,658 are South African born, 429 born in Great Britain and the Dominions, and 61 born in other countries. The process is thus a gradual one, and the demand for holdings is greatest among those who have had lifelong experience of South African conditions.

Another form of settlement is that associated with the Union's irrigation schemes. In these the unreliability of the rainfall is no longer a constant threat to the cultivator; and intensive cultivation can, of course, be carried on the year through.

South West Africa, mandated to the Union, still has considerable areas available for settlement. The territory falls naturally into two distinct topographic regions: the coastal

⁹¹ J. H. Wellington, *Land Utilization in South Africa*, *op. cit.*

desert known as the "Namib" and the plateau (Fig. 22). About a third of the plateau has an altitude of more than 1500 meters; of the rest only small areas lie below 100 meters. Habitability is determined mainly by the availability of water. The rainfall increases from southwest to northeast, being less than one inch for the year in the Namib, and over 23 inches in the Grootfontein district. Because of the low rainfall and its low reliability,⁹² there can be but little cultivation, the only localities where crops are grown to a considerable extent being in the neighborhood of Grootfontein, in parts of the Gobabis district, and in the artesian area of the Gibeon district. From 1933 to 1935, the average area cultivated was 20,000 hectares, yielding an average of 6,000 bags of wheat and 28,000 bags of maize, besides smaller yields of other crops. The country is thus almost entirely a pastoral region, the part to the south of Gibeon being suitable only for sheep and goats, whilst in the central

and northern areas karakul sheep and cattle are the most profitable stock. Karakul sheep are steadily increasing. The number of pelts exported in 1935 exceeded half a million, and farmers are getting rid of merinos and Persian sheep in order to share in the greater profits from karakul pelts. There is a

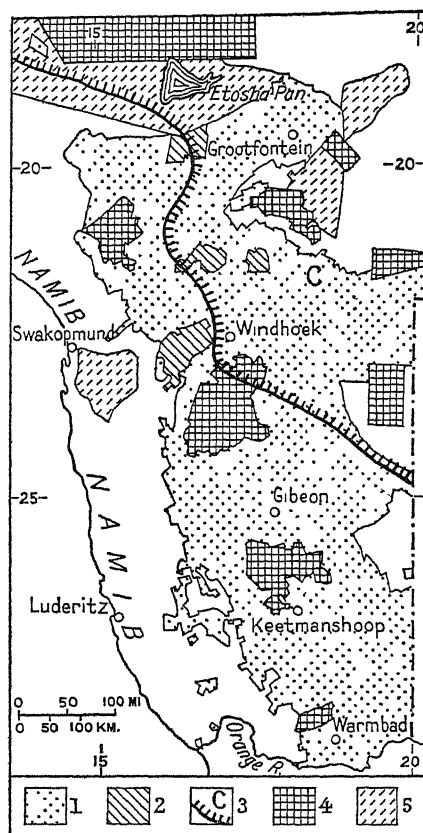


FIG. 22. South West Africa, showing: 1, farmland; 2, unoccupied farmland; 3, cultivation possible where soils are suitable; 4, native reserves; 5, game reserves. (After Obst and Jaeger.)

⁹² H. Maurer: Die Veränderlichkeit der jährlichen Regenmengen, *Koloniale Rundschau*, Vol. 27, 1936, pp. 449-452.

regular export of cattle on the hoof to the Union, which varies in number very greatly according to the rainfall season, both in the Union and in the Territory. In 1935 the export of cattle reached the record number of over 120,000, and butter also exceeded all former production, with an export of 6.3 million lbs.

1935 was an exceptionally good year for production, and the government felt justified in offering more land for settlement. The demand for land is keen, but the government policy is to offer farms only as water can be provided. Most of the land with surface water available is now occupied, and the settlement of new land must now generally keep pace with boring. During the period 1927-1932, 1,422 boreholes were completed, but only 35 during the next four years, owing to lack of funds.

The economic unit of land in the central districts is considered to be about 5,000 hectares (12,350 acres). In the northern districts it is about 6000 hectares, and in the southern districts, to the south of Gibeon, 12,000 to 15,000 hectares (30,000 to 37,000 acres).

In 1935 the allocation of land was as follows:²⁸

Land allocated to natives and reserved for later allocation to natives.....	40.3	million acres
Game reserves.....	23.7	" "
Urban areas.....	1.0	" "
Held by companies (320 farms).....	2.2	" "
Farms occupied (2,935 farms).....	60.7	" "
Government land surveyed and available for use (650 farms).....	12.6	" "
	<hr/>	
	140.5	million acres

The total area of the Territory is estimated to be 206.2 million acres, but the Namib desert occupies 29.6 million acres, so that there remains for disposal some 36 million acres in addition to the 12.6 million acres already surveyed and included in the preceding total.

Assuming the average size of a farm in the remaining area to be 20,000 acres, and that all the remaining land is poten-

²⁸ Union of South Africa, Year Book, No. 17, 1934-1935, p. 1047.

tial farm land, there is still available sufficient land for 2,450 farms. Since a great deal of this land is in the Kalahari sand veld, where boring is difficult and surface water generally lacking, it is probable that the potential number of farms is somewhat less than this. But the final test of the potentiality of the land in South West Africa, as in the other parts of the continent, must remain with the man who tries it out. In this matter the advice given by the poet Horace is still the soundest: "Crede experto."

POSSIBILITIES OF SETTLEMENT IN SOUTH AMERICA

By Isaiah Bowman

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FROM the standpoint of a migrant the total environment of a place must include the people already there. If he is in doubt about the climatic risks or the prevalence of disease, he will wish to inquire what the *people* of the region are now doing about them and what they propose to do or would like to do. It has been said that the only historic events worth mentioning are those that take place in people's heads: ideas, aspirations, mass impulses based upon general convictions about things and their relations. In the heads of potential as well as actual migrants at the present time is the idea that government and society must stand back of colonists in new lands. By one school of thought this is taken to mean that the old pioneering spirit is gone, that people everywhere have become soft, that government aid in home leaving and government subvention for production weaken the moral fiber and directly teach people how to become public wards.

This philosophy may be said to ignore the fact that "things were never as they used to be." Colonists have always had to be aided. The "proprietors" of the American "plantations" always lost on their investment because the colonists could see only their own hardships and the heavily populated cemeteries in their midst and cared little for mere monetary losses on the other side. The clamor for roads, canals, and railways on the part of the trans-Appalachian settlements echoes through more than fifty years of American history. There were always politicians who were eager to give the frontier what it wanted—at public expense. The policy seemed to pay in the United States. Will it pay to adopt the same policy in the development of the marginal lands that now make up most of the

pioneer fringes in five continents? Is a population outlet a matter of cost merely, or is its effectiveness dependent upon innate qualities of race or psychological conditions and trends that are not subject primarily to money controls?

An opposing philosophy points out the difference between old forms and days of colonization and our own. When disease was a manifestation of divine displeasure, and when a more fatalistic idea of life prevailed among all classes and races, the risks of pioneering were easier to bear. Today we know that much can be done to ameliorate the lot of a pioneer by reducing or eliminating what were formerly regarded as inescapable risks. That which can be done by joint enterprise is often outside the power of the individual to do. Public health measures, like irrigation, demand coöperation and a scale of associative effort quite beyond individual capacity and often beyond the power of a single community. Just as we give public attention to occupational risks and provide protection for the individual or for an entire body of craftsmen, if their work is especially hazardous, so colonization in new lands may be looked upon as an occupational risk. If the result of further extension of settlement is the increased welfare of the whole commonwealth, then—so the argument runs—the many may with propriety be called upon to bear a part of the costs of reducing risks and providing more humane conditions for the pioneering few.

We shall not take sides on these important questions. To look at potential areas from the doctrinaire standpoint would be to destroy the objectivity that a scientific study requires. But it would be a fatally deficient study, indeed a naive one, that did not take account of prevailing *ideas* that are themselves a part of the problem of migration and that constitute a part of the future environment of a migrant group as truly as the amount of colloids in the soil or the seasonal variability of the rainfall. When we speak realistically of the clash of cultures this is what we mean. It is a thing easy to see when black and white meet, more difficult to see when white men move into already occupied white territory. Therefore, in dealing with South American possibilities of settlement it will be necessary by way of preface to speak of peoples and sys-

tems of society and government, and the history of past undertakings, as well as the physical character and capacity of the underpopulated lands.

Eastern Andean Valley Zone

Broadly speaking, there are two types of possibilities in areas of potential settlement: to form wholly new settlements

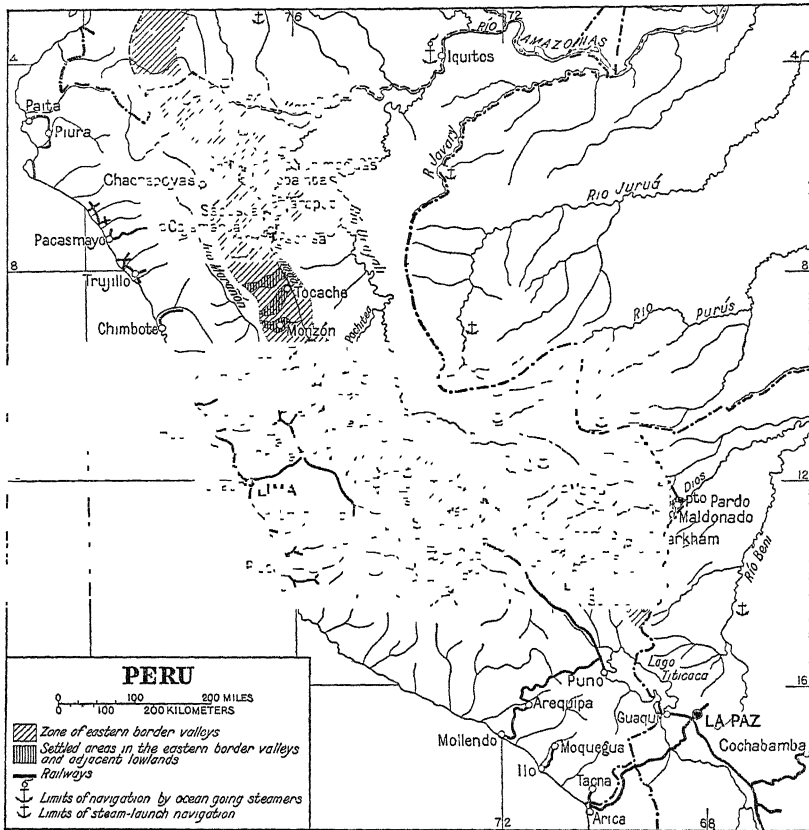


FIG 1. Settled areas in the eastern border valleys of the Andes in Peru. (From *Pioneer Settlement*, Amer. Geogr. Soc., New York.)

in advance of the margin of agricultural occupation or to brigade new settlements with the old. Both types have had varying degrees of success in so wide a variety of conditions in South America that their historical development is analogous to the progress of a scientific experiment. The Ba-

varians of the Pozuzo colony in the foothills of the Andes of eastern Peru, the Mennonites in the Gran Chaco or in Chihuahua, Mexico, represent sustained efforts to keep migrant social groups intact, unmixed, and culturally powerful in a vanguard position, with all the attendant risks, limitations, adaptations, and experimentations that such a course and such a position require. After seventy years the Pozuzo colony is almost exactly its original size, 150 families.¹ Its well-kept houses and fields attract favorable attention, but the exports are small and have to be transported either over bad trails to Huanuco or Cerro de Pasco (there to compete with products grown close at hand), or by steam launch downstream to distant Iquitos with oppressive freight charges. It is not surprising, therefore, to learn that the effort of the Peruvian government to establish another colony near by (with settlers from California) was abandoned after a few months. The Mennonites of Chihuahua, Mexico, are now actively planning a return to Canada, being disappointed in their attempt to grow a familiar wheat crop. They also find themselves no longer secure in their earlier enjoyment of special privileges in being permitted to maintain their own schools, in which their religion is one of the principal subjects of study and observance.

In sharp contrast to the general failure of artificial forcing of settlement is the success of migratory movements that supply their own initiative or driving power. In the Urubamba Valley of eastern Peru and in the Yungas of eastern Bolivia, to take but two of many eastern Andean examples, settlement was self-directed from the start. It was accomplished by people of Spanish descent who knew how to import both permanent and transient or seasonal labor from the highland zone near by, and it knew the importance of political agitation at Lima or La Paz. Whatever gave these valleys economic opportunity and strengthened the hands of the hacendados had political implications and guaranteed "order and progress" as these terms were uniformly understood from the time of

¹ Raye R. Platt: "Opportunities for Agricultural Colonization in the Eastern Border Valleys of the Andes," *Pioneer Settlement*, *Amer. Geogr. Soc. Special Publ. No. 14*, 1932, pp. 99-100.

Pizarro. Improvements might be slow in coming, but each decade had something to show for the pains of agitation. If government did too little—a chronic complaint—at least it

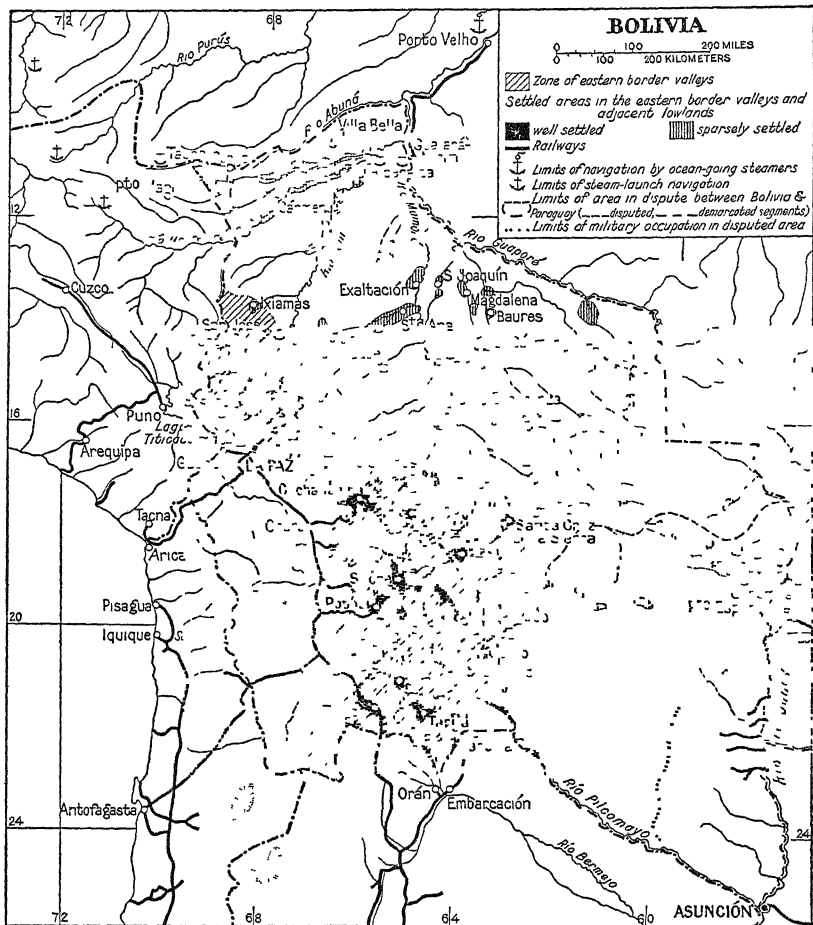


FIG. 2. The settled areas in the eastern border valleys of the Andes in Bolivia. (From *Pioneer Settlement*, Amer. Geogr. Soc., New York.)

was composed of men of the same stock and outlook as the frontier hacendados.

The fundamental element in the economic life of the eastern valleys is the Spanish capacity to exploit the native. The integral communities of foreign colonists have no such capacity. They live a life apart, come from a more humane civiliza-

tion, have ideals of human relations that make exploitation of their fellow man, though an Indian, awkward if not obnoxious, and adhere to forms of production and culture that place them at a disadvantage in competition with the creole class that has learned how to rise on the back of the Indian. Native exploitation takes many forms, and the plantation system is one of the most effective. The native goes with the land of a plantation but does not own it. He continues on it as a privilege for which he must make return in produce or free labor, a continuation of the conditions of the *encomienda*, or concession system, begun in the sixteenth century as a feature of the Conquest. His labor is supplemented by contract labor from the plateau, seasonally imported. He does not bargain with his "patron"—which is the privilege of imported labor—but takes what he can get.

The wise patron treats his labor decently, judged by local standards, but discontent is always in the air. It could not be otherwise in view of the obvious inequality in the distribution of the fruits of labor. The display of luxuries cannot be avoided on the part of the hacendado and his family. The peon labors in order that the son of the hacendado may have training, say in a foreign engineering school, and that the daughters may have their seasons of social life in the largest accessible city. In most of Hispanic America more than three centuries of agricultural history can be written around the exploitation of native labor through the hacienda system. The benefits of the white-Indian association are, of course, not all on one side. The native who is tied to a hacienda has an assurance of livelihood and enjoys protective relations, through his patron, that at times distinctly better his condition.

The hacienda system is also an effective agency of distant frontier settlement because it is so nearly self-contained. Houses, mills, furniture, roads, labor in the fields, weaving—these can all be made or done on the spot. Only concentrated products, like brandy or alcohol, coca leaves, tropical fruit (limited), and skins and hides can stand the transportation charges; and imported goods must therefore be reduced to a minimum. This means that they must be made on the hacienda by the native without cost to the owner. A new road opened,

a railway extended, better launch connections, any *service*, in short, is an advantage to the hacendado, not to the native. How efficiently the whole organization has been developed may be judged by the fact that there is continuing competition between new railway lines and the llama or mule pack train. This is seen on all the highland lines of the plateau and their extensions toward the eastern valley zone. The Oruro-Cochabamba line was constructed at such prodigious cost, and the freight rates have had perforce to be so high, that the line has contributed very little to the agricultural development or prosperity of the Cochabamba region.

The maximum extension of white agricultural occupation of the eastern valley zone took place during the era of rubber gathering in the Amazon country. Here was an auxiliary product that called for supplies, transport, imported labor, and government of sorts. It was the tragedy of the Madeira-Mamoré Railway, almost in the heart of the Amazonian lowland, that it came near the end rather than at the beginning of an era. The rubber posts have been largely withdrawn. Manáos lives in its past. As early as 1911 it was just possible to lay down rubber in Hamburg at the bare cost of production, without margin for profit on investment in concession and organization. With the rise of the plantations of southeastern Asia the rubber business of South America collapsed. It is not generally appreciated that this put an end to the dream of railways into the main eastern valleys of Ecuador, Peru, and Bolivia. There is insufficient export of unique products to maintain them. Local produce is too directly in competition with that which is available close to the centers of consumption. There is no part of the world market for eastern valley products that cannot be more economically supplied elsewhere.

From the standpoints of climate and productivity the eastern valleys of Bolivia, Peru, and Ecuador are a paradise; but they can be used by white settlers only by putting the burden of development and maintenance on the backs of natives. Each settlement is still a comparatively lonely outpost. There is no broad Atlantic Coastal Plain, no huge Middle West. The countries in which they lie are too poor to encourage colonization by direct subvention as Argentina once

did through grants for seeds, animals, and agricultural tools. The leaders who dreamed of expansion in terms of the example of the United States find that realization never comes because the whole economic, social, and physical setting is different.

A unitary conception of national life is lacking in most of the South American republics. Government in more than one country is control for special privilege without even the saving grace of a professed idealism. In proportion to the difficulties (which mean cost) the prospective returns on the investment of money in additional trans-Andean railways are palpably too small for such small countries to succeed in attracting capital. A narrow, desertic, locally irrigated, coastal fringe will no more support such railways for the benefit of the interior of Peru (which contains the largest number of potentially important valleys) than can a highland people still living a life quite similar to that which the conquistadores found four centuries ago.

The eastern Andean valleys would be ideal for colonization if they were on a seaboard, any seaboard. As matters stand, there can be no development of them short of a time when a world demand for their products has come into being through the denser peopling of the earth. We can get our products more cheaply from lands that are nearer. We can also get what we want by going after it on the spot. Agricultural chemistry has altered the meaning or lessened the force of a good deal of geography in the world picture. As an agent of conquest, chemistry is cheaper than a railway that (in Peru and Bolivia) requires tunnels and bridges in endless succession. Chemistry is by no means everything; there are obvious climatic limitations. Sky and sun are inviting here and repellent there. Peru has developed her eastern valleys too slowly over the centuries. Now the scientific world has found a way to do without the products of those valleys. Chemistry has caught up with and defeated the prophecies of an Amazonian Empire such as von Humboldt made. As a pioneer fringe, an area of potential settlement, the eastern Andean valley zone from Colombia on the north to Argentina on the south is valuable to the countries concerned, but it has no possi-

bilities that are of practical concern to any substantial number of immigrants who wish to escape crowding and establish homes that conform to modern dreams and ideals.

South-Central Chile

In South-Central Chile the frontier zone (La Frontera) has absorbed a migration of notable size. Active colonization began in the 1850's with the first breaking down of the long-maintained resistance of the Araucanian Indians. The success of the early movement was largely due to German settlers. What they accomplished was "so significant and important to Chile, indeed, that it is hard to realize how slight a thing numerically the German element was and is."² The region now has nearly a fifth of the entire population of Chile,³ and most of the movement has taken place since 1900! The population of Bío-Bío, Cautén, Valdivia, and Llanquihue, numbered 893,112 in 1930. What was almost uninterrupted forest country in 1903, when the railway was built through the territory, is now largely cleared, fenced, and cultivated land.

Settlement was so rapid that it "outran government provision for it." Land titles were clouded or did not exist at all.

It became a common practice for a workman to get himself established as renter, hired laborer, or inquilino on a farm, and then assert a claim to the land he occupied, knowing that the proprietor could

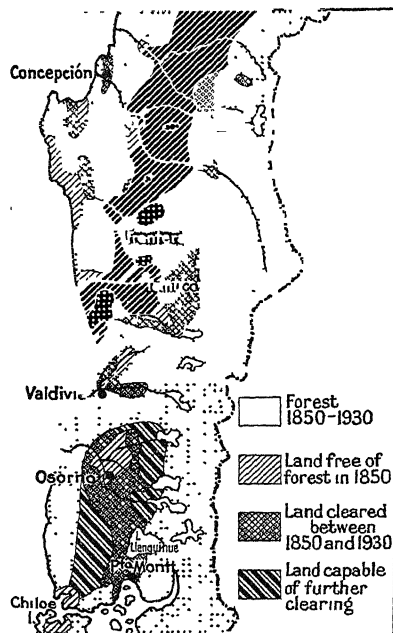


FIG. 3. Map showing the progressive clearing of the forest in southern Chile. (From *Chile: Land and Society*, by Geo. M. McBride, Amer. Geogr. Soc., New York.)

² Mark Jefferson: Recent Colonization in Chile, *Amer. Geogr. Soc. Research Series No. 6*, 1921, p. 28.

³ George M. McBride: Chile: Land and Society, *Amer. Geogr. Soc. Research Series No. 19*, 1936, p. 297.

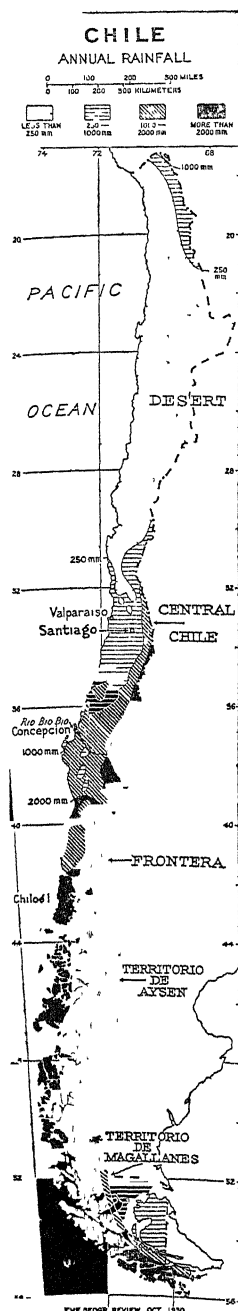


FIG. 4. Limitations of Chilean agriculture. (Courtesy of *The Geographical Review*.)

establish no conclusive evidence of ownership. The confusion regarding titles resulted in frequent violence, sometimes on a large scale. So profoundly was this affecting the prosperity of the region that after eight different laws had failed to solve the difficulty and the problem seemed too extensive for ordinary court procedure, the unusual measure was adopted of creating a special cabinet department to deal with the situation. This Ministry, entitled that of the Propiedad Austral, was to attempt to bring order out of existing chaos in the matter of land titles and bounds.⁴

Actual occupation for a period of ten years and due improvement of the property were accepted in place of formal deeds. The Araucanian community lands are being individualized. While the Indians as a separate racial group (100,000 a generation ago) have almost disappeared, they still own some of the best land and seem able to hold their own with the whites.

The struggle with the forest, in this southerly belt of heavy rainfall, is incessant. "For 900 miles the woods are so wet that it is impossible to set a fire for clearing without constant relighting, even when all the people of the countryside turn out to attempt it."⁵ On the island of Chiloé, at the southern margin of forest settlement, the maintenance of clearings has been called "the eternal problem." When ready for cultivation the land is worth little more than the cost of clearing. With few exceptions settlement is limited to the fringe of the island, in spite

⁴ *Ibid.*, p. 304.

⁵ Mark Jefferson: The Rainfall of Chile, *Amer. Geogr. Soc. Research Series No. 7*, 1921, p. 1.

of government efforts to build roads to the interior and provide the settler with a small frame house. The island has even had to contend with an emigration problem.⁶

Foreigners as well as Chileans have participated in the colonizing movement—German, Swiss, English, French, and Spanish.

Traveling through the old Araucanian territory, one not infrequently comes upon farms whose owners bear such names as Turner, Shaw, Smith, Williams, MacDonald, Bunster, Depallens, Dumay, Ravet, Keller, Rossellot, etc. Some of these families have become quite Chilean, some keep in contact with others of their nationality and retain much of their European heritage. Present statistics (1930) show only 9,808 foreigners in this region, but a count including descendants of recent immigrants would probably raise the figure to 30,000 or 35,000. The largest foreign national group at present is the German with 3,000; the Spanish follow with 1,819; the French show 819; the Italians 596; the Swiss 593.⁷

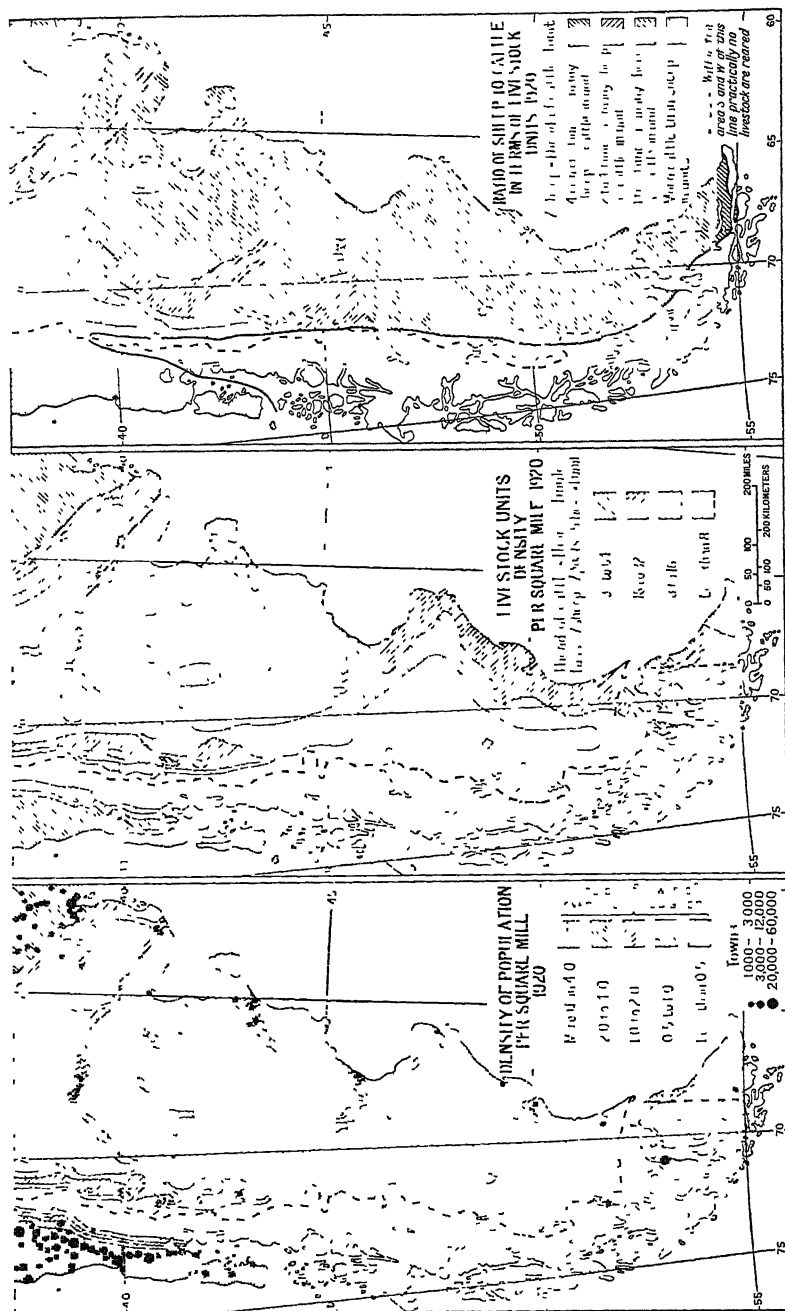
Even if the population figures are interpreted generously, there is but one foreign colonist to twenty-five Chileans in the south-central provinces of La Frontera. Important as the foreign elements may be, they are insignificant from the standpoint of relief to the lands from which they come. The opportunities for land occupation are now greatly diminished. As a frontier zone the region is now and will remain for some time a laboratory of settlement. Socially and economically it is of high interest and of high value, too, to Chile as a nation. It is no longer a major population outlet and, except for a more restricted area in Magellanic Patagonia, it is the last of the undeveloped territory of Chile.

The Patagonian Region

The southern parts of Argentina and Chile constitute Patagonia. It was settled from the north by people of Latin origin; and from the south by English, Scotch, Welsh, Boers, and others. Sheep ranching (predominantly) and cattle ranching are the only permanent forms of occupation outside the irrigated oases along the valley floors of the northern half of

⁶ William S. Rudolph: *The New Territorial Divisions of Chile with Special Reference to Chiloé*, *Geogr. Rev.*, Vol. 19, 1929, pp. 61-77.

⁷ McBride, *op. cit.*, p. 297.



FIGS. 8, 9, 10. Population density, livestock density, and ratio of sheep to cattle in Patagonia. The densities were calculated from the areas of the departments, measured by planimeter from the map, and the statistics in the government publications. The isopleths were then drawn with reference not only to these densities but also to facts observed by the author [Wellington D. Jones in "Present-Status and Future Possibilities of Agricultural Land Utilization in Patagonia"] in the field and obtained in the literature.

the region. From the Rio Colorado on the north down to Tierra del Fuego the eastern two-thirds of the country is very sparsely settled, and the rainfall and stream flow are too small to support farming by irrigation or otherwise. Most of the land is government-owned, and some is occupied by squatters living in isolated huts far from the widely separated ranch houses.

With few exceptions, towns are restricted to the Atlantic coast. Along the seaward border of the sheep-ranching country there are eleven export towns for the shipment of wool and (of late years) frozen mutton. It still takes several weeks for the long lines of wool carts to reach the ports from distant interior points after the season of shearing. Railroads are few and short with one exception—the line from San Antonio to Nahuel Huapi. The motorcar is a recent and promising instrument of transport though still limited to local roads or the flatter stretches of pampa.

On the whole, Central Patagonia offers little prospect for the overflow populations of older lands. Simpson⁸ calls it “desperately poor” with no prospect of betterment. It provides only a bare livelihood for those now established there. It is sheep country “and even for sheep it is ill adapted.” Since it is now supporting all of the sheep it can, there is no room for population expansion here. It is inferior to southern Patagonia or to the mountain border pastures of the sub-Andean zone. It is like the American West of the 1850’s, in stage of civilization, but without the natural resources that might lead to a better future. While there are a few scattered farmers, they play no significant part. Simpson continues: “Their foothold is so meager—in the great bulk of Patagonia, from the Rio Colorado to the Strait of Magellan, they have only a few narrow strips of land, at best a mile or two across and to be numbered on the fingers of two hands. . . . Patagonia will be its savage self and its people set apart from all others.”⁹

The following summary of agricultural possibilities that may eventually attract small additional populations is taken

⁸ George G. Simpson: *Attending Marvels, A Patagonian Journal*, New York, 1934, pp. 106-107.

⁹ *Ibid.*, p. 125.

from Jones's report published four years ago as part of a general study made under the auspices of the American Geographical Society of New York.¹⁰

The irrigation cropping possibilities in the valleys of the Rio Negro, the Rio Chubut, and the Rio Colorado have been studied primarily from the engineering viewpoint. Further studies in these areas as to lands suitable for development should be carried out, studies involving availability of water, cost of supplying water, character of soils, kinds of crops that might be raised, and the probable soundness of such development. It would appear that the chief function of these larger irrigated areas, as of the small ones, may well be the supplying of supplementary feed to the sheep ranches, and the finishing of stock brought from the ranches, rather than the raising of crops to be exported from Patagonia. Certain types of crops, such as vegetables, may be raised to supply food to the local population, but wheat probably can better be imported from the Pampas farming region. At present there is only a very small acreage of any kind of crop grown south of the lower Chubut valley on the Atlantic coast or of latitude 44° S. along the margin of the Andes. Judging from the kinds of crops grown on the few acres now in cultivation and the climatic data available, summer temperatures in these southerly latitudes of Patagonia are not sufficiently high to afford a period long enough to ripen wheat or maize.

The somewhat greater density of population and of livestock and the presence of some crop growing in the Andean border zone as compared with the sheep ranching region suggest that in this mountain borderland the possibilities of development may be considerable. As a matter of fact, the potentialities of this zone constituted a major reason for beginning the construction of railroads westward up the valley of the Rio Negro and from San Antonio and Puerto Madryn. In the Andean border the rainfall is sufficient to produce natural pasture with a much higher carrying capacity than exists in the drier region to the east, and crops can be grown, except on the more porous soils of glacial outwash flats, without irrigation. More studies must be carried out, however, before precise estimates can be made as to how much land can be put into crops and as to how much more livestock can be reared in the area. Three types of commercial agriculture seem to have promise in addition to cattle ranching, namely dairying, apple growing (summer frosts may make this impracticable), and the production of forage crops to be sold to the sheep ranches to the east.

A not unimportant phase of the economic development of the Andean border [of Patagonia] is closely related to the non-agricultural forested mountains to the west. This latter zone is one of great natural beauty.

¹⁰ Wellington D. Jones: "Present Status and Future Possibilities of Agricultural Land Utilization in Patagonia," *Pioneer Settlement, Amer. Geogr. Soc. Spec. Publ. No. 14*, 1932, pp. 139-144.

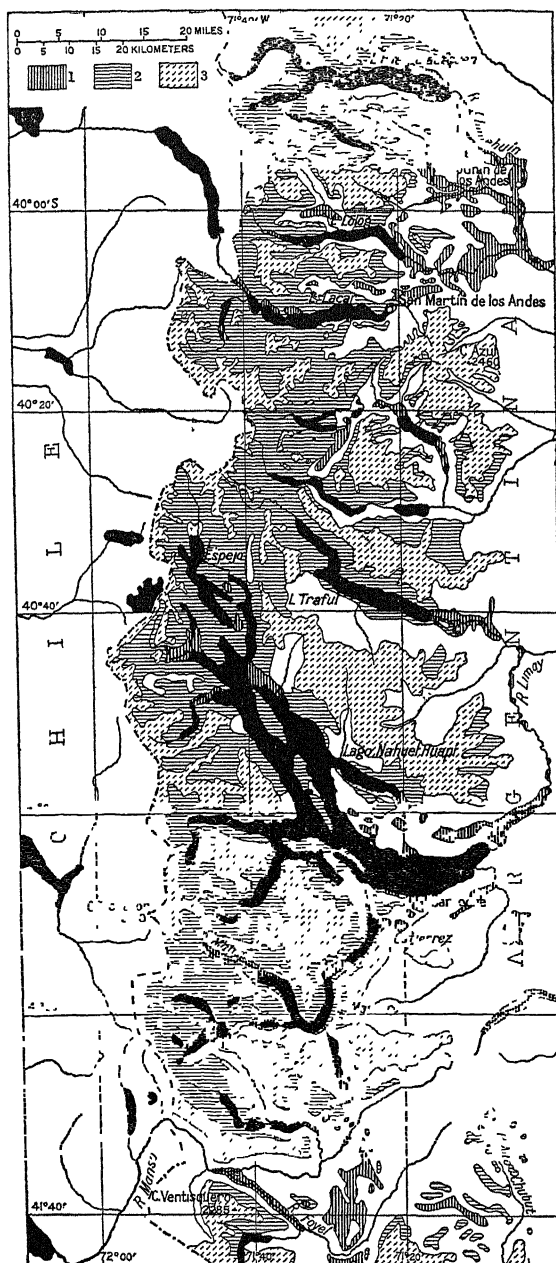


FIG. 11-A. (continuous with Fig. 11-B) Classification of land in Argentine part of Andes and in East Andean border, between 39°40' and 43°40' S. Key to symbols: 1, land suitable for crops, in part requiring irrigation; 2, virgin forests suitable for timber supply; 3, alpine zone, above about 1500 meters, with grassy meadows suitable for summer grazing.

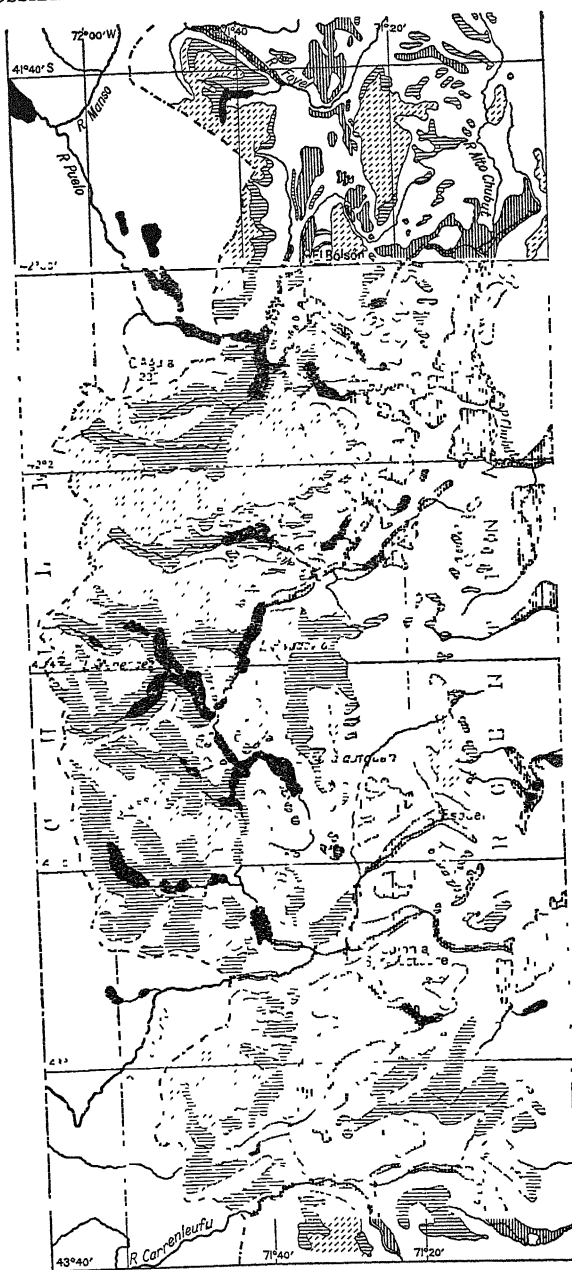


FIG. 11-B. (title concluded) Lakes are in black. The white areas in Argentine territory represent grazing lands, composed of recently burned forest areas, brushy mountain slopes, and drier grassland areas east of the Andes. (From *Pioneer Settlement*, Amer. Geogr. Soc., New York.)

Its heavily glaciated mountains and valleys, with many arrestingly beautiful lakes and streams, are a resource that has been recognized by the Argentine government in its establishment of the Parque Nacional del Sur and in the proposal of the Chilean government to establish a similar recreation reserve. If this mountain zone develops into tourist country, as it well may, the agricultural border zone is the area where hotels will be established and various other means of caring for visitors set up. An important local market for the products of farms and ranches will thus develop, and the prosperity of the area be increased. From the tourist standpoint further study of both the Andean border and of the mountain zone is desirable.

In addition to the value of the Andean forests in Patagonia as regulators of stream flow and as elements in the scenic beauty of the landscape, they constitute a readily available source of fuel and building material for near-by agricultural settlements. On the Chilean side certain species . . . are cut and sold for timber outside the region. The forests as a whole are not composed of valuable timber species. With the building of railroads to and across this section of the Andes, hydro-electric power might be used to run the trains, for coal imported from overseas would be costly. The demands of the local population for current for light and for small amounts of power in the towns and on ranches could also be met. Whether or not any considerable manufacturing industries will develop to use much of the possible electric power is highly conjectural. . . .

The pioneer character of agricultural development in most parts of Patagonia is strongly pronounced. The relatively new and unstabilized sheep ranching industry dominates the economic life; changed though it may become in numerous respects, ranching undoubtedly is the best use of most of the area and will continue economically supreme. Close settlement can never be expected except in the larger irrigated valleys and in the East Andean border.

The extreme southern part of Patagonia adjacent to the Strait of Magellan and including the western half of Tierra del Fuego is owned by Chile. There is no lack of national interest in its development.¹¹ Chilean citizens are now increasing in numbers in the region, though it is 1200 miles from central Chile to the Magellan region, or as far as from Sitka, Alaska, to San Francisco. The best houses are Chilean and Chileans form the bulk of the laboring population. Large-scale business "is chiefly in the hands of foreigners, English, Jugoslavs, Germans, and Spaniards predominating. Here, as in the Llanquihue region, the Chilean is like an alien in his own

¹¹ McBride, *op. cit.*, pp. 339 *et seq.*

country and complains that men from abroad are extracting the wealth of the land."¹²

"The world's southernmost farm land is found upon Navarino [55° S.]: this island, though mountainous and heavily wooded, supports a number of small *estancias* with thousands of sheep along the northern coast."¹³ North of the Strait, and

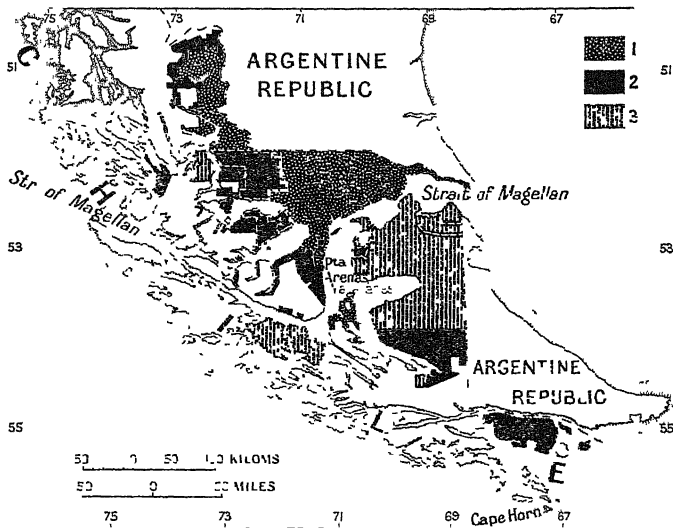


FIG. 12. Map showing the status of land tenure in the Magellan region of southern Chile. Key to symbols: 1, lands definitely alienated and now in private ownership; 2, lands given in "concessions" by the government; 3, lands leased by the government. Within 2 and 3 the areas surrounded by a broken line represent lands which will revert to the respective types of tenure indicated after certain contracts and leases now in force shall have lapsed. (From *Chile: Land and Society*, by Geo. M. McBride, Amer. Geogr. Soc., New York.)

still in Chilean territory, there are protected valleys and piedmont tracts that have no forest cover and yet have a rainfall of about twenty inches—grasslands, "green enough for grazing all the year round and generally free from destructive storms." Travel and transport are mainly by water through a labyrinth of channels that cross the Andean chain.

"The Commune of Aysén, including the capital of the province of the same name, in 1930 contained 6,835 inhabitants. Here, too, little of the torrential rain of the west coast pene-

¹² *Ibid.*, p. 342.

¹³ William E. Rudolph: Southern Patagonia as Portrayed in Recent Literature, *Geogr. Rev.*, Vol. 24, 1934, p. 263.

trates. . . . The Commune [of Última Esperanza] . . . has 4,987 inhabitants, and the immediately adjoining commune (Cerro Castillo) raises the figure for this district to 5,639."¹⁴

In the two Chilean provinces of Aysén and Magallanes, there are 2,000,000 head of sheep. Most of the land is owned by large companies with laborers living in barrack-like structures. Small landowners live in scattered shacks. Extensive leases are no longer freely made, the effort of the government being directed toward the placing of small proprietors upon the land. While thousands of Chilean settlers will here seek the independence they cannot find in central Chile, where the land is held by relatively few owners, there is no outlet for any important number of settlers from overseas.

The Pampa and Northern Argentina

Today Argentina has an estimated population of 12,200,000, of which 8.5 millions live on the pampa, the agricultural and economic center of Argentina.¹⁵ A considerable part of these 8.5 millions is concentrated in large cities—Buenos Aires, Rosario, Santa Fé—while about 5 millions are spread over rural areas of the pampa, which has a low average density of 16 persons to the square mile. In 1930 only 27 per cent of the land of the pampa was under plow, the rest being used for the grazing of cattle and sheep. Today, 90 per cent of the cultivated land of Argentina is found within the pampa, along with 75 per cent of the cattle, 56 per cent of the sheep, 80 per cent of the industry, 70 per cent of the railroads, and 70 per cent of the population.¹⁶

From the establishment of Argentine independence in 1810 until 1854, there was practically no immigration. Agriculture was virtually confined to the outskirts of cities. It was the con-

¹⁴ McBride, *op. cit.*, pp. 345-346.

¹⁵ The Pampa includes the plains lying mainly between 30° and 40° S., the plains between the lower Paraná, the Río de la Plata, and the Atlantic on the east, the Atlantic on the south, the "Monte" region on the west, and the Chaco on the north. Politically, the pampa includes all of the province of Buenos Aires and parts of the provinces of Córdoba and Santa Fé and of the territory of Pampa Central. Some writers consider the southern part of Entre Ríos as belonging to the Pampa.

¹⁶ Franz Kuhn: *Grundriss der Kulturgeographie von Argentinien. Untersuchung eines südamerikanischen Lebensraumes nach anthropogeographischen und geopolitischen Gesichtungspunkten*, Hamburg, 1933, p. 73.

tinuous immigration of European farmers that made the pampa of Argentina one of the leading granaries of the world and at the same time made possible a remarkable improvement in the quality of livestock, which had been poor in the days of the gaucho. Between 1857 and 1930, 6,300,000 persons of various nationalities, mainly Italians and Spaniards, migrated to Argentina. Many of these were not permanent settlers but returned to their mother countries after a season or two. However, except for three brief periods (the year 1891, the years of the World War, and between 1932 and 1935), immigration has exceeded emigration. A large percentage of the immigrants settled in cities; others tried their luck at agriculture.

There is a marked difference between agricultural colonization in the United States, especially on the prairie, and that of the pampa of Argentina. In the United States the land-seeking immigrant long had ample opportunity to find free or cheap land. The immigrant of the pampa found that there was no public land to be had and that he must buy or rent from an established land owner.

Agricultural colonization started in the Province of Santa Fé with the settling in 1856 of the colony of Esperanza by French-speaking and German-speaking Swiss, who were joined later by Italians. Swiss, Italians, Germans, and French led among the settlers of the colonies founded between 1856 and 1893 in Santa Fé and Entre Rios.¹⁷ These colonies were established by individual land owners or companies who were willing and anxious to sell their land, and who by one means or another sought to attract colonists. They divided the land into blocks of farm size and sold or rented them to settlers. Most of those who originally rented the land had the opportunity eventually of becoming farm owners.

Only a relatively small percentage of all the immigrants who took up farming settled in the agricultural colonies of Santa Fé and Entre Rios or in the Litoral and became independent farmers and land owners. As immigration increased,

¹⁷ Mark Jefferson has given us an excellent account of the agricultural colonies in Santa Fé and Entre Rios in his study "Peopling the Argentine Pampa," *Amer. Geogr. Soc. Research Ser. No. 16*, New York, 1926.

land values rapidly went up; land owners became aware of the value of their land and many of them preferred to keep the land and have others work it for them rather than sell it and be forced to invest the money in unfamiliar enterprises. Wide areas well suited to agriculture are today attached to large estancias the owners of which are mainly interested in livestock. Land belonging to such estancias can be rented for short periods only and under condition that the farmer will sow alfalfa after he has raised two or three crops of wheat or maize. Thus, for the estancia, renting is only a means of obtaining alfalfa pasture, which is practically indispensable for fattening cattle.

All of these factors led to the development of the tenant farming system that is so widespread in the pampa.¹⁸ Tenant farmers usually work much more land than they would if they were the owners. As a result, their farming methods are poor; cultivation is extensive and as a rule consists of a single crop which is often specified by the owner of the land. The shortness of leases under the tenant farm system is the chief obstacle that prevents the farmer from growing more than one or two kinds of cereal—a condition that leaves him at the mercy of the hazards of market and climate. The tenant will never pay any attention to crop rotation, which would prevent soil exhaustion, nor will he improve his housing conditions. Since he must leave the farm after a short period, he erects a very primitive shelter, and this he is frequently required to destroy if the land is turned back to pasture.

Under the tenant system there can be no development of farms of the diversified type, that grow vegetables and fruit, raise cattle, pigs and poultry, like those found in the colonies of Santa Fé and Entre Rios and in the communities of the Litoral, where the farmers are usually the proprietors of the

¹⁸ During the year 1932-1933, out of 132,470 farms recorded in the cereal zone 84,983, or 65 per cent, were run by farmers who rented the land. It would probably be no exaggeration to say that 80 per cent of the sown area was sown by tenant or share farmers for these statistics cover even the smallest farms of under 10 hectares (25 acres). Farms of under 50 hectares (125 acres), the great majority of which are probably worked by owners, numbered 57,895; the total number of farms worked by their owners was under 47,500. (*From Immigration and Settlement in Brazil, Argentina, and Uruguay: II, International Labour Review*, Vol. 35, 1937, p. 355.)

land. The economic and social disadvantages of this system of "nomadic" tenant farming are only too obvious in spite of the fact that it must be recognized as the means by which the rapid expansion of agriculture was made possible.

There is a growing number of persons in Argentina who favor state action in regard to settlement, especially since private settlement schemes have failed in recent years. The activity of these schemes "consisted in buying land, breaking it up, and reselling it on the instalment system, usually for six annual instalments, to farmers wishing to become land owners."¹⁹

In September, 1936, the Minister of Agriculture submitted to congress a bill that proposes the foundation of a Federal Institute for settlement questions, to be headed by a "National Settlement Committee" composed of a chairman and two directors. It is proposed to make the Committee autonomous and give it the power to take any measures necessary for the accomplishment of its task under either public or private law. The preamble of the bill includes the following definition of policy:

"We are still the country of big landowners and tenant farmers, but if large-scale capitalist production, imposed upon us by the geographical and social conditions of an incompletely developed country, has still a mission to perform, it does not exclude the possibility of small and medium-sized undertakings. . . . We must now create a united and strong agrarian class, which will be an element of economic progress and a factor of social welfare and stability. The agricultural hired worker, who wanders the country in search of a day's work, is a sad reality in our country, which we must endeavour to abolish. No rational organisation can be built on so shifting a foundation. . . . The problem consists in transforming labourers who have no capital save their work and the indispensable tools into independent landowners. . . . In our country, and especially since the agricultural depression, the tenant farmer has been unable to save sufficient capital to buy his land. Although this statement cannot be proved by statistics, it is confirmed by direct and personal observation.

¹⁹ Immigration and Settlement, etc., *op. cit.*, p. 356.

Ownership must therefore be founded upon work, and not upon already accumulated capital. A method and an institution must be created to make the ownership of land possible for all. Only the State can assume this function. . . . We also propose to create conditions that will encourage the selected immigration which our country requires. . . . This we cannot do unless we offer immigrants reasonable economic prospects. The present Bill supplies that need. Agriculture offers the widest scope for immigration. Urban industries need at the most a few specialised workers, while the Argentine countryside is still empty. . . . This Bill, recommended by the Executive, may mark the first stage in the resettlement of our rich agricultural region and in a new social development of the countryside. The change will make the underpaid wandering labourer a thing of the past. Forgotten also will be the dubious shifts to which he is now driven by the struggle to obtain a bare livelihood for his overworked and undernourished family. . . . The funds allocated by the Act to settlement are, in fact, merely a sacrifice made by the country as a whole to itself for the sake of improving its economic and social organization."²⁰

The bill gives priority to Argentine applicants looking for land: after these come aliens who have lived in the country for at least five years, and, finally, aliens who have arrived more recently. With reference to immigration, the bill states, "Although we must give preference to our own nationals, it is also necessary to encourage the immigration of competent foreign agriculturists with the necessary capital for developing their land. . . . It is high time to start an influx of immigrants, which is both desirable and necessary for the country." International coöperation leading to immigration would be possible under the provisions of the bill. "The Committee may come to an arrangement with groups of agriculturists domiciled abroad or with competent bodies to establish immigrants in the official settlements, either as owner-farmers from the outset or as tenants to begin with, on condition that such immigrants possess the wherewithal for working their land."²¹

²⁰ Immigration and Settlement, etc., *op. cit.*, p. 362.

²¹ *Ibid.*, p. 364.

Provided that the Argentine government is able to overcome the financial difficulties that caused the failure of the private settlement schemes, and also provided that a sufficient number of large estates can be divided and land speculation checked, there is a limited outlook for further settlement in the pampa. The settlement of immigrants with capital does not constitute a problem. There is land in the hands of speculators from whom "immigrants with 10,000 or 15,000 pesos can buy 75 to 100 hectares of land in the finest agricultural area of the country, supplied with the necessary livestock, on which the farmer can not only live free of debt but actually prosper."²²

Immigrants without any means have no opportunities under the present conditions; they are not admitted. So far as settlement goes, Argentina has departed from the open door policy. The only immigrants admitted are those who have been sent for by a settlement undertaking or who hold a contract for the lease or purchase of land. Persons without such a contract but in the possession of at least 1500 pesos may be treated as immigrants intending to engage in agriculture. Persons who join relatives already settled in the country and former residents returning after a temporary absence are also admitted.²³

In his last report the Minister of Agriculture says: "There can be no question of reopening the doors to mass immigration, for this would injure both the country and the immigrants themselves. It is true that the country needs a much denser population than that which can result from its natural increase alone. But it is equally certain that mass immigration is no longer possible in the economic conditions of the world of today. Not until the Republic has solved certain problems arising out of its internal economy will it find a rational basis for the proper selection and distribution of any additional workers that it may need in the future."²⁴

There remains to be considered the western or Andean region, including the provinces of Mendoza, San Juan, San

²² *Ibid.*, p. 365.

²³ *Ibid.*, p. 353-354.

²⁴ *Ibid.*, p. 354.

Luis, La Rioja, Catamarca, and Tucumán, and, finally, the northern region, especially the territories Chaco, Formosa and Misiones.

The Andean region is arid and mountainous, so that cultivation is possible only in limited areas with irrigation. Land is very expensive and viticulture and the sugar industry have already reached the limits of expansion under present market conditions. Production is so much larger than demand that the provincial governments seek to prevent the extension of the cultivated areas.

In the northern sub-tropical zone, in particular in the territories of Chaco, Formosa, and Misiones, agricultural developments have a definitely pioneer character. Misiones, with its yerba-maté cultivation, attracts land-hungry settlers who do not have the means to establish themselves in the pampa and are not willing to lead the life of a tenant farmer.²⁵ Their farms are usually small—a result of the forest vegetation—and the hoe is the main tool. The farmers raise maize, manioc, potatoes, sweet potatoes, etc., as foodstuffs for their families and produce yerba-maté as a cash crop.²⁶ The production of yerba-maté has increased in recent years so rapidly that a national tax of 4 pesos has been placed on each new tree planted.²⁷ If a new cash crop could be found in addition to yerba-maté, Misiones could become an important center of agricultural colonization, as large tracts of land are still undeveloped. The total area of Misiones comprises 3.5 million hectares of which, in 1928, only 62,707 hectares (or 2 per cent) were under culture.

Large numbers of settlers came to the territory of Chaco and to a lesser extent to Formosa when their potentialities as cotton country became known. Before the beginning of cotton culture these territories had only the livestock and quebracho industries.²⁸ The area under cotton in the Chaco territory lies along the railway between Santiago del Estero and Resistencia

²⁵ Theodor Brinkmann: *Der Yerba Mate-Bau im argentinischen National Territorium Misiones als Grundlage bäuerlicher Siedlung*, *Berichte über Landwirtschaft*, N.F., Bd. XI, 1930, pp. 403-442.

²⁶ *Ibid.*, p. 410.

²⁷ *Immigration and Settlement*, etc., *op. cit.*, p. 369.

²⁸ Theodor Brinkmann: *Ackerbau und Kolonisation im argentinischen Chaco*, *Berichte über Landwirtschaft*, N.F., Bd. XII, 1930, pp. 499-540.

on the Paraná. It increased from 3,000 hectares in 1915 to 100,000 hectares in 1925,²⁹ and to 85 per cent of Argentina's cotton area, or about 240,000 hectares, in 1935.³⁰ In the new agricultural colonies and villages along the Santiago-Resistencia railway, most of which have been established since 1915, there are found many immigrants of different nationalities—Italians, Spaniards, Germans, Jugoslavs, Poles, Russians. The necessary initial capital for settlers who wish to try their luck in the pioneer zones of Misiones and the Chaco amounts to several thousand pesos less than that which is required in the pampa.

The greater part of the land of the territories belongs to the national government, which has the land surveyed, decides on the location of agricultural colonies, and sells in lots of 50 to 100 hectares. The settlers in these colonies first make themselves self-supporting by raising their own food; then they turn to growing cotton. However, cotton cultivation in the Chaco has its hazards. From time to time the yield is diminished because of lack of rain or because of an early frost. One or two failures is often more than a young settler can stand. As in all pioneer regions, there is, therefore, a coming and going of settlers.

The Brazilian Realm

In square miles Brazil and the United States are approximately equal. Recently we have had estimates of an ultimate maximum population in the United States of less than 200,000,000. This takes account of the resource limits of the country as well as the declining birth rate and the effect upon it of urbanization and a rising standard of living. In 1924 Albrecht Penck estimated that Brazil could carry a population of 1,200,000,000 people. Within a year there has been published by Freise a quite different estimate on the basis of the census of 1920 and an analysis of both the land capable of agricultural use and the normal food requirements.³¹ He concludes that Brazil can support an agricultural population of

²⁹ *Ibid.*, p. 536.

³⁰ Immigration and Settlement, etc., *op. cit.*, p. 370.

³¹ Friedrich Freise: Brasiliens Bevölkerungskapazität, *Petermanns Mitt.*, Vol. 82, 1936, pp. 143-147.

395,000,000. If industry were to increase in like proportion, there would be added another 30,000,000. Excluding the Amazon forest, Brazil could thus ultimately support about 430,000,000 people. This assumes that the standard of living will remain the same, that there will be no decline in the birth rate with the further growth of city population, and that all arable land is so situated that it can be cropped.

Freise concludes that ten per cent of the total area of Brazil (outside the Amazon forest) can never be used economically. The areas include the dry caatinga; the flooded borders of the Amazon and the Paraguay; areas already ruined by burning, crusting of soils, gullying, and erosion; mountain slopes with an inclination of more than thirty-five degrees (!); mangrove swamps of the coast, etc. Probably his ten per cent would become twenty or thirty per cent if future soil erosion corresponds with the realities of experience in the United States of America.

It would appear, from the above population estimates, as if Brazil were a modern land of opportunity. But the high rate of return of Brazilian immigrants to their mother countries (48 per cent in the state of São Paulo) points a warning. There is no adequate planning for land use. Little technical advice is available to the settler in the clearing of the land and the growing of unfamiliar crops, except in the case of the Japanese colonies and through private enterprise. The governments of the states of Santa Catharina and Rio Grande Do Sul have pursued a wiser policy, encouraging settlement at a fairly rapid rate in order to support the initial wave of occupation. In other words, they have recognized the importance of an acceptable degree of social density and economic density. Population increase in pioneer territory should progress with a certain speed because a working social organization and successful economic life both require densities that spread the burden of indispensable public services such as roads, schools, and transport.

As the report of a recent field study puts it: "Brazil is in this exceptional situation: alone among the great immigration countries, it has still, after fifty years of large-scale immigration, an enormous area of undeveloped land of great fertility,

situated in zones in which the European can easily become acclimatised. It is this abundance of land which has permitted Brazil to receive and keep many millions of immigrants in the past, and which justifies the expectation that, despite the present check on migration movements caused by the depression and other circumstances, the overpopulated countries will continue to make large and valuable contributions to the population in the future. But while it is true that millions of men could find in Brazil to-day a plot of land sufficient to feed them and a house to shelter them (timber for building is available close at hand in almost every part of the country), emigrants prepared to ask no more than the satisfaction of these elementary needs are almost impossible to find in the emigration countries of Europe. Further, their establishment in Brazil in such primitive conditions would contribute nothing to the economic prosperity of the country—on the contrary, it would act as a dead weight hampering the social progress which every organised community must promote. In other words, in order that settlement may not be foredoomed to failure, there must be a chance, however small, of selling part of the produce of the land, and so, by exchange, of obtaining the goods and services essential to a civilised life.”³²

A large number of “ifs and oughts” have to be taken into account when one speaks of opportunities for settlement in the frontier zones of Brazil:

1. The incoming settler, whether with or without capital, ought to have had previous farming experience: strong muscles are better than theories when man and nature meet on the frontier, though theory has a place.
2. He ought to have an accommodating attitude toward his adopted country, with its unaccustomed climate, culture system, and people.
3. Technical experts ought to be available to guide settlers and help them in the making of preliminary plans for the founding of new settlements under specific environmental conditions.
4. Newcomers ought to have a period of probation, as in

³² Immigration and Settlement in Brazil, Argentina, and Uruguay: I, *International Labour Review*, Vol. 35, 1937, p. 225.

South Africa, under schemes of settlement supported by both private and public agencies.

5. If the federal and state governments look upon a settler as merely one more head of population, rather than as an integral part of an economic system, the outgrowing stream of returning migrants will be discouragingly and wastefully large.
6. If settlers are to remain contented they must be protected from excessively high prices for land and equipment and from exploitation by large land companies organized for speculation. Some of the land companies are rationally organized and operated and supply the capital indispensable for producing and marketing facilities.

Three broad regions in Brazil will next be described in terms of settlement opportunities and conditions, southwestern Brazil, the central Brazilian Plateau, and the Amazon lowlands.

Southwestern Brazil

A great thousand-mile belt of grassland and mixed forest is found about the headwaters of the Paraguay River and its main tributary, the Paraná. Its ends are of the order of several hundred miles from the sea. It lies partly in four countries—Argentina, Bolivia, Paraguay, and Brazil—though its most extensive tracts and its boldest development pertain to Brazil. Here also is greater promise for future settlement than in the other parts of the belt except for the Argentine portion which, though smaller by far, enjoys public order, integration of transport, and high possibilities—not yet fully realized—for the production of sugar and cotton.

The protracted Gran Chaco War, recently closed, has paralyzed the states of Paraguay and Bolivia, so that immediate development of the disputed grasslands west of the Paraguay is out of the question, though the construction of wells and military roads and the acquisition of a better knowledge of the country are tangible advantages. In time this region may have a substantial development, but governmental stability and a definitive settlement of the territorial question are the

of the question. Most of the Highland suffers from a protracted dry season that may extend over the months of June, July, and August. Plateau stream beds may then be quite dry and large areas of pasture become suddenly inaccessible for want of water for the stock. The seasonal rainfall—October to April—has a high run-off coefficient and the ground water is low precisely where pasture and health conditions are best, namely, on the broader or higher interfluves.

The disposition of the several "countries" of the region has been described by Schurz.³³

The Matto Grosso Highland is bounded on the west and south by well-defined lines of escarpments, below which lies a secondary zone known as the *pé da serra*, or piedmont belt. The valleys of the rivers incised in the plateau contain belts of true forest, which give way to lines of *buritý* palms in their upper reaches. The *chapada* or *chapadão* [which includes most of the tableland] is largely covered with a sparse scrub vegetation that gives evidence of the poor quality of the soil. These steppe lands are known locally as *campo cerrado*, or "closed country," to distinguish them from the *campo limpo*, or "clean country," i.e., treeless lands, which lie to the south of the plateau or cover the slopes of the valleys of the west-flowing tributaries of the Paraguay. The wide expanse of the *campos de vaccaria*, or cattle country, lying largely to the south of the Northwestern Railway between the Paraná and the Paraguay (roughly along the 20th parallel), forms the largest single area of this open prairie country. As its local name signifies, it is well suited to the raising of cattle. The piedmont zone of the west-facing edge of the plateau has likewise long been the center of an important cattle industry. Thus a series of famous old *fazendas*, or ranches, follows the line of this intermediate zone from São Luiz de Cáceres in the north (lat. 16° S.) around by Peconé, Coxim, Aquidauana, and Miranda in the south (lat. 20° S.). Between this westward-sloping piedmont and the Paraguay River lies the vast low region of the *pantanal*. Though furnishing excellent pasturage during much of the year, this zone is subject to inundations that cover most of its extent with a shallow layer of water, forcing herds to be driven to higher ground until the flood has receded. On the right, or Bolivian, side of the main river there are a number of so-called *lagunas* (*lagoas* in Portuguese) which serve as vast storage reservoirs for the flood waters of the Paraguay and so retard somewhat the fall of the river after the annual rise.

Matto Grosso vegetated through most of the nineteenth century. The

³³ W. L. Schurz: "Conditions Affecting Settlement on the Matto Grosso Highland and in the Gran Chaco," *Pioneer Settlement*, *Amer. Geogr. Soc. Special Publ. No. 14*, 1932, pp. 110-111, 114-116, 122.

old gold washings no longer repaid their working, and no new fields of importance were discovered. Most of the dredging enterprises begun in the latter decades of the century were failures; Cuyabá and the other towns declined in population and activity. Villa Bella on the Guaporé is long since a ruin, and Diamantino is a sleepy hamlet. Only Corumbá has shown any vitality or signs of progress. In the meantime the fast-multiplying herds of cattle, that today form the chief wealth of the state, roamed the ranges without a market, except for an occasional *boiada* that was driven across the Paranahyba into São Paulo. The new interest in rubber, dating from about 1896, sent some of the more adventurous into the forests to the north and northwest of Cuyabá in search of the *Hevea*. Some rubber came into Corumbá for shipment from northeastern Bolivia, but the total of all this was small compared with what went out by the Amazon. . . .

Realizing the necessity of further strengthening its hold on the upper Paraguay country, the Brazilian government pushed the Northwestern Railway to completion in 1914, thereby linking the Paraguay River with São Paulo and Rio de Janeiro. With the railway there has come a new current of immigration and added impetus to the opening up of the southern zone of [Matto Grosso]. Considerable numbers of immigrants from the states of São Paulo and Rio Grande do Sul have moved into the districts of Campo Grande and Tres Lagoas. Many Japanese have also settled in this part of the state. Furthermore, the founding of large *frigoríficos*, or packing plants, in the state of São Paulo has provided a better market for the cattlemen of Matto Grosso and is forcing them gradually to improve their stock. Great ranches like the "Descalvados" of the foreign-owned Brazilian Land, Cattle, and Packing Company have grown up on the upper Paraguay and wherever there are large areas of good pasture lands. Some of these cattle find their way in increasing numbers to the *frigoríficos* of São Paulo; the rest supply the local *saladeros*, or jerked-beef plants, whose product is shipped to the River Plate or eventually to the Cuban market.

The average size of a ranch in the Matto Grosso Highland is 5,000 acres, and it is estimated that there are 6,000,000 head of cattle in the states of Matto Grosso and Goyaz. Manioc, corn, beans, rice, tobacco, and crude sugar are grown on a small scale in the vicinity of the towns. Here as in the eastern Andean valleys the long haul to market makes agricultural production unprofitable. Neither the railway nor the motorcar has yet overcome the handicap of distance, nor does there appear to be real progress in this direction despite the large sums spent on crucial lines like that from Bauru (on the edge of the São Paulo network) which extends northwestward

for nearly 800 miles across Matto Grosso to the Paraguay. At Porto Esperança, about 55 miles south of Corumbá, it connects with a river highway that completes the turn to the sea. The railway is owned and operated by the federal government.

With heavy freight rates on the railway, traffic still seeks the Paraguay from both sides of the river. Here are old links by trail, canoe, and launch that survive all the changes of the centuries since settlement began. It is remarkable what human and animal strength will do in bringing down goods to the river bank from far away ranches and villages—the days of a man's life measured against a freight schedule. This is one of the permanent frontier regions that has remained in an experimental state for four hundred years. Now and then there is a wave of enthusiasm, by either Brazilian or foreigner, respecting the potentialities of the region and how they might be realized by railway and highway extensions and an encouraged immigration. But there is more than land and climate in the way of difficulties to be overcome. Again as through the centuries there is no substantial change in the modern period with respect to insecurity and that local law and economic control that make one man lord in his own realm, able to set the terms of living for hundreds around him.

Man himself as part of the environment here deserves the following characterization by Schurz.

The maintenance of law and order naturally presents serious problems in a region so large and thinly settled as is Matto Grosso. It is impossible for the state, with the limited means at its disposal, to make its authority felt everywhere. The small force of state militia has proved incompetent to put down local opposition to the government at Cuyabá such as occurred when the famous Morbeck refused to allow the state to collect the export tax on diamonds in the Rio das Garças country. Cattle thieving has also been common and flagrant at times along both the Bolivian and Paraguayan borders, the presence of Paraguayan renegades aggravating the disorder. Moreover, the state government of Matto Grosso has at times shown little consideration for formal agreements made with private interests, as in the notorious case of the concession of the General Rubber Company in the upper basin of the Tapajóz. The Indian tribes in Matto Grosso do not present any seri-

ous problems for future settlers. Beyond the limits of the Amazon jungle they are entirely pacific, and their tribal rights are well guarded by the federal government of Brazil, which aims to protect them from exploitation by the whites. In 1924-1925 large parts of Matto Grosso were seriously disturbed by the depredations of *revoltosos*, or bands of rebels, who took refuge there after the failure of the São Paulo uprising of 1924.

A word as to pioneer conditions in Brazil nearer the border of established settlement. In Paraná the mixed character of

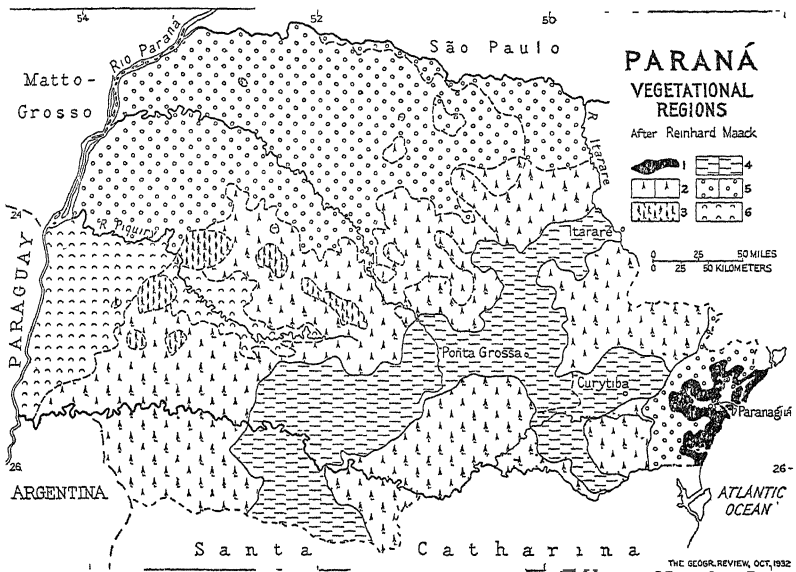


FIG. 14. Vegetation map of Paraná. Key: 1, costal zone, including mangrove, xerophytic plants, palms, and selva; 2, Araucaria region; 3, yerba maté in pure stands; 4, savannas; 5, evergreen broad-leaf forest; 6, transition forest: areas of important settlement stippled. (Courtesy of *The Geographical Review*.)

the vegetation exercises an influence upon the rate and loci of settlement, as well as upon the economy of the settlers, as shown in Figure 14. Besides scattered settlements in portions of the grasslands, there are clearings and plantings in the transition forest, the more extensive crops being maize, wheat, rice, manioc, potatoes, beans, and small but important areas of fruit and vineyards. "The *Araucaria* region and the savannas are free from malaria, and are therefore more suitable for colonization than the coastal zone or the broadleaf forest re-

gion below the 500-meter line in the interior. Only under the lure of coffee has this latter region been penetrated."³⁴

Substantial work on the conditions of pioneer settlement in the state of São Paulo has been done by Deffontaines.³⁵ Settlement is advancing rapidly across the broad and still unexplored zone in the western part of the state known as the Sertão, conspicuously along the railways. Only twenty-five years ago the region was still marked on the maps as unexplored territory inhabited by Indians. The fertility of the land



FIG. 15. Map of the State of São Paulo, showing the pioneer fringe.

depends upon the presence in the surface layer of soil of a thick black humus, formed by the decay of forest litter. To form a settlement, the forest is cleared of underbrush and smaller trees. Cutting is done at the beginning of the winter dry season,³⁶ and the wood is fired just before the rains—

a delicate operation because the land is made unproductive if the humus of the soil is largely burned out. The colonist secures the aid of contractors specially skilled in the job of burning. The pioneer crop is maize, which is fed on the stalk to the half-wild black pigs that are sold to the fazendas for fattening. Pig raising is here a pioneer occupation, playing the role that honey, cheese, rubber, livestock, coco leaves, or brandy is known to have played in specialized situations in some frontier situations elsewhere. After a year or two, coffee planting is begun, when the coffee bush can obtain "the breath of the forest," to use a local expression. It is the main revenue producing crop. But the forest humus is rapidly exhausted. Consequently the chief coffee-producing centers are constantly displaced toward the

³⁴ Preston E. James: A Vegetation Map of Paraná, *Geogr. Rev.*, Vol. 22, 1932, p. 677.

³⁵ Pierre Deffontaines: Pays et paysages de l'état de Saint-Paul (Brésil): Première esquisse de division régionale, *Ann. de Géogr.*, Vol. 45, 1936, pp. 50-71 and 160-174.

³⁶ Robert S. Platt: Coffee Plantations of Brazil, *Geogr. Rev.*, Vol. 25, 1935, p. 237.

west—"the coffee wave rolls on to Matto Grosso" with high but ephemeral yields. Thus there is a constant displacement of rural labor toward the west; new towns at the ends of railway lines grow at an extraordinary rate. The rush is at the expense of the country in the rear, which suffers a slow depopulation.³⁷

The pioneer settler of western São Paulo is a small man compared with the traditional plantation owner: dozens of laborers upon individual holdings rather than hundreds as upon the larger plantations of São Paulo. New coffee plantations have been forbidden in São Paulo, but in the northwestern part of Paraná immense plantations are still being established. Limited by the restrictive laws passed at the time of the coffee crisis of 1928, the landowner plants other crops in increasing quantities: rice, encouraged by the advent of Japanese settlers; wheat, and even rye, grown by German colonists newly fled from Nazi Germany; and the Brazilian bean which gives fabulous yields. Thus the pioneer front of São Paulo has a farm economy and a distribution of farms and farmers approaching those of the southern states, Paraná and Santa Catharina. The worker leaves the plantation to become a small owner himself. The result is a rapid increase in the density of population; greater, in fact, than that of the

³⁷ "Agriculture . . . [in São Paulo] is suffering from an acute shortage of labour. According to various informants, many landowners do not sow their land because they are afraid that they will not be able to obtain the necessary labour for the harvest. In the season of 1935-36, although 51,000 workers entered the State under the auspices of the authorities and 30,000 more gravitated to São Paulo spontaneously from neighbouring States, while the rural population increased very considerably, the cultivation of cereal crops was observed to have declined and 20 per cent of the area under coffee plantations was left uncultivated, the necessary labour having been absorbed by the cotton plantations, which are more profitable and at present in the full tide of their development. The area under cotton has in fact increased from 72,000 hectares, employing 30,000 workers, in 1932, to 653,000 hectares, employing 250,000 workers, in 1935. Rapidly though agriculture has developed in São Paulo (between 1904-05 and 1930-31 the area under cultivation rose by 941,215 alqueires [3,847,900 acres], representing an average annual increase of 40,000 alqueires [240,000,000 acres]), it has always been held up by a lack of labour. A striking illustration of the chronic shortage of labour is provided by the fact that between 1889 and 1935 the Government of São Paulo brought into the country, at its own expense, no less than 1,162,183 immigrants to meet the needs of agriculture alone. Between 1889 and 1902 the cost of this item to the State amounted to over 7 per cent of its total expenditure. The total number of immigrants, including 1,488,809 spontaneous immigrants, was thus 2,650,992." Immigration and Settlement in Brazil, Argentina, and Uruguay: I, *International Labour Review*, Vol. 35, 1937, pp. 235-236.

zone of the older large coffee fazendas. The division of company lands is going on at a rapid rate. Land surveying is a new and lucrative business!

The very structure of the coffee industry has been founded on advance into new land; the *colono* system of plantations, methods of planting and harvesting, objectives in marketing, public promotion—all have been shaped with reference to establishment of new plantations rather than maintenance of old ones.

So hasty has been the advance and so strong the spirit of bonanza production that only highly attractive areas have been occupied. . . . The present area of production, 5700 square miles, is only five per cent of the area of the state of São Paulo and less than half of the potential coffee land in the state. Thus, as far as land is concerned, the process of expansion may continue for many years.

Another factor has appeared. The present coffee-producing area is seemingly small for the premier source of a prominent world crop; but it is not small in fact for a crop of high yield per acre and low consumption per capita. In spite of the fact that coffee is a crop of narrowly specific requirements limiting it to fertile spots in low-latitude highlands, not many such spots are needed to satisfy the world market, and Brazil has no monopoly of them. Consumption, not capacity for production, appears to limit the industry.

Perhaps the era of expansion is at an end. In view of world-wide depression in general and the failure of Brazilian coffee policy in particular, the coffee region may retain its present form for many years to come, its gaps unfilled, its frontier unchanged.³⁸

In distinct contrast to the above is the opportunity to settle in the midst of settlement. The foreign colonies in Argentina have had notable success because they were integrated with an existing system. They have become Argentine in language and spirit to a remarkable degree. Their holdings in the northern river-and-plains country are both extensive and rich. The same may be said of the German settlements of southern Brazil. In neither case is the land filled up in the sense that more population means a lower standard of living. The family

³⁸ Robert S. Platt, *op. cit.*, p. 239.

FIG. 16. Maps illustrating the growth of coffee production in the main producing areas of Brazil. For 1909-1910 the production in São Paulo only is shown. On the maps for 1835-1836 and 1854-1855 the main producing areas are delimited by a light line; the chief roads are also shown. On the maps for 1909-1910, 1919-1920, and 1927-1928 the extension of new plantings is delimited by a light line and railways are shown by a heavy line (Courtesy of *The Geographical Review*.)

that wants a land base and seeks it in a fairly familiar social environment can have it here, but at a price.

Jefferson has written interpretatively of land and culture in the state of Rio Grande do Sul³⁹ where German settlements have maintained integrity of character but lost to some degree the exclusive German speech. They are proud of their schools which their children attend until they are fourteen—an achievement of greater merit because the settlers came from an uneducated class and had no encouragement from either government or native Brazilians. The invasion of Portuguese speech is slow but inevitable. The stock still looks upon intermarriage with Brazilians (with a general tinge of Negro and Indian) as a mark of social decline. For all the outward evidence of comparative prosperity, the life is neither German nor Brazilian but is regarded as an improvement upon the poverty that originally led to migration. Only those equally poor could be induced to submerge their nationality and mortgage their children's future to become an island in what is and will remain a mixed Portuguese, that is Brazilian, sea. The European remains a foreigner because assimilation means that he must dilute his blood and degrade his culture.

In the hot moist coastal region of the state of São Paulo, southwest of Santos, one finds the most important center of pure Japanese colonization. (See Fig. 7, on page 178.) While most of the earlier Japanese immigrants sought employment as tenants on the coffee estates of São Paulo, an increasing number have come in recent years to occupy their own farms in the coastal areas of the states of São Paulo, Minas Geraes, and Espírito Santo. Here the buildings, the fields, the crops "have all been reproduced from those of Japan."⁴⁰ The background is not snow-capped volcanoes but a mantle of blue-green forest and sullen grayish rolls of rain-bringing clouds projected against the intricately dissected slopes of the Serra do Mar. Rice is first in importance; tea and yerba maté are additional products. Anxious about assimilation of these exotic

³⁹ Mark Jefferson: Pictures from Southern Brazil, *Geogr. Rev.*, Vol. 16, 1926, pp. 521-547.

⁴⁰ See recent references and brief description in Preston E. James: Japanese Colonization in Brazil, *Geogr. Rev.*, Vol. 27, 1937, p. 145.

groups, Brazil has set a yearly quota of about 3,480 Japanese immigrants (April, 1936).⁴¹

The total number of Japanese in Brazil is about 173,500, of which more than 90 per cent are settled in central and southern Brazil, the rest living mainly in special land concessions elsewhere, including the state of Amazonas. Forty per cent are coffee plantation laborers, thirty per cent semi-independent farmers, and an additional thirty per cent independent farmers. A Japanese company organizes the economic activity of the immigrants, selecting, purchasing, and selling land, financing transactions, and engaging in warehousing, engineering, banking, and other collateral activities.⁴²

Central Brazilian Plateau

We think of Brazil as lowland principally. Important in every sense is the great northwestward-declining upland of the southern interior with its high rim, the so-called Serra do Mar. Where harder materials on the rim have most greatly resisted erosion, individual peaks or groups of elevations rise to heights from two to three thousand feet above the general level, or an absolute elevation of seven thousand to eight thousand feet and more. Deffontaines has described the present conditions of agriculture and grazing in this limited mountain zone that extends from the hinterland of Bahia southwestward to the states of Santa Catharina and Rio do Sul.⁴³

The higher peaks are in the zone of frost. Their upper slopes and shoulders together with intervening higher stretches of plateau provide summer pasture in some places and winter pasture in others. Thus the heights which separate the basins of the São Francisco and the Tocantins on the borders of Bahia and Goyaz are utilized during the dry winter season, April to October. One hundred and twenty miles from Rio is the massif of Itatiaya, one of the highest summits of

⁴¹ The new Federal constitution limits immigration in any one year to two per cent of the nationals of any country who have made their homes in Brazil in the last fifty years. This makes the allowable annual quota 27,475 Italians, 3,118 Germans, 417 British, 151 Dutch, 221 North Americans, 184 Swiss.

⁴² J. F. Normano: Japanese Emigration to Brazil, *Pacific Affairs*, Vol. 7, 1934, pp. 42-61.

⁴³ Pierre Deffontaines: Mountain Settlement in the Central Brazilian Plateau, *Geogr. Rev.*, Vol. 27, 1937.

Brazil, where winter drought is pronounced and frost is not uncommon. Here the herds are driven to the high pastures in summer, since the lowlands are especially trying in that season on account of the insect pests.

"The mountain [zone] is the stronghold of the small farmer and of polyculture. It supports a type of agriculture very different from that of the great one-crop fazendas that have spread from the littoral zones into the low plateaus of the interior—the matta of eastern Minas, the *terra roxa* of São Paulo, the deltaic plains of the campos."⁴⁴

Small-scale mountain farming is much more recent than the plantation for, as we have elsewhere made clear, the plantation type of cultivation and organization has been associated with pioneering and early colonization in South America for four centuries. It was in the early eighteenth century that the mountain country of Minas Geraes attracted the small farmer who supplied the mining population that came in in numbers during that period. Beans, maize, potatoes, onions, were grown on the summit areas of the escarpment, four thousand feet above sea level. These small settlements were complementary to the mines and declined with them at the beginning of the nineteenth century.

Below these higher farms was a belt of forested mountainous country where the small farmer could find a foothold on cheap or free land. German and Italian small farmers began the colonization of this zone, not always with success. "The Italian colonies carefully built up viticulture, which now makes Rio Grande the chief wine producer of Brazil. So the forested serra, empty and unused a century ago, now is the most populous part of southern Brazil. Its population density of 35 to the square kilometer contrasts strikingly with the old stock-raising areas of plain or plateau, where the density is scarcely 10 to the square kilometer."⁴⁵ Espírito Santo showed a similar course of development, the mountains being cleared valley by valley, settlements established in the valley bottoms, and the growth of farm crops begun, supplemented by coffee or sugar cane under suitable conditions.

⁴⁴ *Ibid.*

⁴⁵ *Ibid.*

Enough has been said to show that considerable Brazilian territory is at a sufficiently high elevation to attract European settlers who look for a temperate zone counterpart, but the attraction is, so to speak, valley by valley, not at all a continuous occupation with a closely knit economic organization. It is inconceivable that even the full exploitation of the upland, whether of highest valleys and slopes or within the forest zone of the upland border, would attract more than a few millions of population at the utmost, and the time required to effect maximum development is a matter of decades. The efforts of the federal government have not been successful in stimulating settlement in the zone. The Swiss experiment at Nova Friburgo declined from 1,600 persons to not more than a dozen families. In 1900 the federal government established two nuclei of settlement on the forested southern scarp of Itatiaya, one of 2600 feet above sea level, the other at 4300 feet. Germans, Italians, and French were established there, "accommodations were built, lots distributed, and vegetable and fruit culture begun." One of the two principal settlements is completely deserted, its houses in ruins, its orchards invaded by bamboo. The other settlement has but a few families left. "Similar unsuccessful attempts at official colonization have been made in the Serra Bocaina."

In short, the development of the mountain zone must be by trial and error on the part of small groups who discover what the land is worth and adapt themselves and their modes of cultivation to special and local conditions of living as they find them. The alternative of government supervision seems not to work in Brazil where failure has been as conspicuous as in some of the enterprises fostered under the British Empire Act, notably in Western Australia.

The Amazon Lowlands

The most important production developments in forested Amazonas are the outcome of company exploitation, generally under the leadership of one man in each subregion of consequence. The influence of a single individual is well described by Hanson.

The life and optimism found at Cachuela Esperanza [in northeastern Bolivia] are also found, to a certain extent, at Riberalta. With the possible exception of Iquitos, there is no place that I visited in the Amazon basin where depression troubles were being met with such courage and resourcefulness and energy as here. Characteristically, however, it is due to the energy and drive of one man. On the Orinoco [Venezuela], San Fernando de Atabapo boomed during the reign of Funes, who had energy even though he was a ruthless and degenerate tyrant. The Brazilian Rio Negro and the Branco have probably never seen better days than during the reign of Lobo d'Almada, a colonial governor who was in power for seven years during the eighteenth century; but on his removal the region went downhill. On the Amazon, Itacoatiara was long pointed out as a garden spot and a beautiful, healthful place to live in. Credit for its superiority was unanimously given to a Mr. Stone, an American settler who died a few years ago. The same phenomenon may be seen in Iquitos today. While Manáos is hopelessly "in the dumps" over the rubber slump, Iquitos is going energetically ahead, developing a growing trade in coffee and cotton to take the place of the dead rubber trade, and the major credit for this is given to one resident Englishman, Mr. Massee, the local representative of the Booth line.⁴⁶

But a region cannot be said to have important settlement possibilities when isolated leadership of this sort is the sole basis of success. The chief drawbacks to a European migration to the Amazon country are the debased social conditions, the depressing climate, the high cost of housing and the scarcity of food of an acceptable sort. The population of the Amazon basin exists on a diet that would be wholly unacceptable to American and European migrants. Deficiency diseases are common. Since the practical extinction of the rubber industry, there is little to be exported and therefore very little to be imported. In the Brazilian Rio Negro country most of the settlers on the river still engage in trade—rubber, Brazil nuts, and palm fibers. They pay little attention to agriculture, live largely on imported dried fruit, and malnutrition is prevalent. On the great cattle plains of Brazilian Guiana, where more than 200,000 head of cattle are grazing today, fresh meat is almost unobtainable and the problem of malnutrition is as serious as on the jungle rivers. Vegetables seem never to be planted and meat is seldom eaten fresh. Ice is unobtainable

⁴⁶ Earl Hanson: *Social Regression in the Orinoco and Amazon Basins*, *Geogr. Rev.*, Vol. 23, 1933, pp. 597-598.

almost everywhere. The population is scattered. Each ranch is a self-contained community.

As a population outlet, the Amazon country is still of theoretical interest only, as it was in von Humboldt's day. There are deep soil and superabundant rainfall and plant growth, but there are also high temperatures, excessive humidity, wide separation of settlements, and a scattered, unreliable, native Indian population. Living discomfort is the rule and there is no outlook. When the price of rubber goes up, the small agricultural settlements are abandoned by men who can make more money gathering rubber. If the British experiment of growing Brazil nuts in the East is successful, the industry will decline in Brazil since the nuts are now gathered at an "incredible labor cost." Patience is lacking to care for the young trees during the years required to bring them to maturity. Development of the Amazon country is marginal in every respect and has been since the beginning of settlement several centuries ago. The tropical East draws upon native or imported labor that is both cheap and abundant. To develop additional plantations in the East, there is required only an extension of the occupied land. The Amazon forest is almost like a continent apart from the rest of the world. The bordering upland populations supply it with mere outposts of settlement.

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